Rock Products

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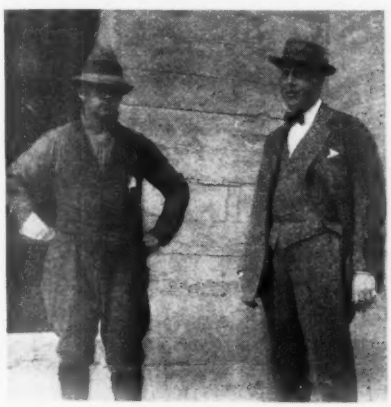
Iowa's Model Crushed Stone Plant

Plant No. 2 of the Hawkeye Quarries Company is a Hillside Working with Gravity Flow Sheet—New Equipment Makes It One of the Most Modern in the State

By R. N. Van Winkle

General Manager, Hawkeye Quarries Company

PLANT No. 2 of the Hawkeye Quarries Co., better known probably to the local trade as the Glory quarry, is located on the Waterloo, Cedar Falls & Northern railway, which is primarily a freight hauling interurban line operating between Waterloo and Cedar Rapids, cities of population of 36,000 and 50,000, respectively. The plant, from a standpoint of territory and moderate sized cities to serve, is quite advantageously located; it being only 19 miles from Waterloo and 39 miles from Cedar Rapids, which are two of the many progressive, growing cities of Iowa.



General Manager VanWinkle is the gentleman on the right

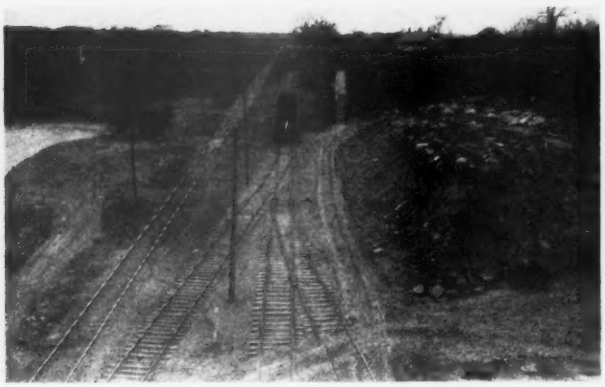
Within the last year this plant, under new management, has been entirely rehabilitated until now it ranks with the most modern, if it is not the most modern limestone quarry and crushing plant in the state.

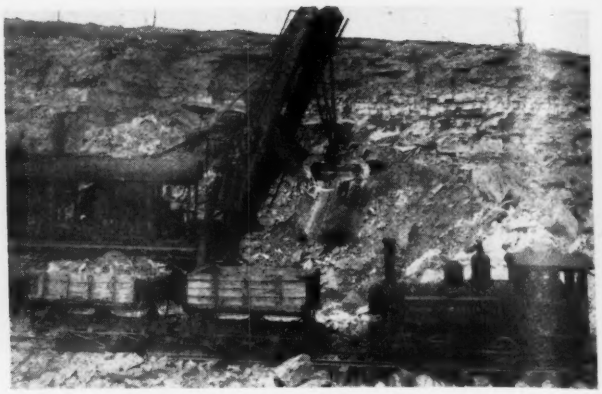
The quarry proper is what, in the vernacular of quarrymen, is termed a hillside proposition or a hillside quarry and at the present time a 45-ft. face 1600 ft. long has been developed. The overburden or stripping, which runs from 3 to 8 ft., consists of dirt and slabby stone. It is being removed with a Thew steam shovel, 36-in. gage saddle tank Vulcan locomotive and 4-yd., square-box, two-way dump cars to a stripping dump well away from present or possibly future quarry operations.

For the drilling operations, two Armstrong No. 25 electrically driven deep blast hole drills are used; holes being drilled 48 ft., or approximately 3 ft. below the quarry floor. Considerable experimenting has been done with shooting or blasting, but at the present time 40 per cent straight nitroglycerin dynamite in cartridges 5x10 in. are being used, these being exploded

The sign not only advertises the quarry but the better roads movement

View of the Hawkeye operations including the quarry and the plant

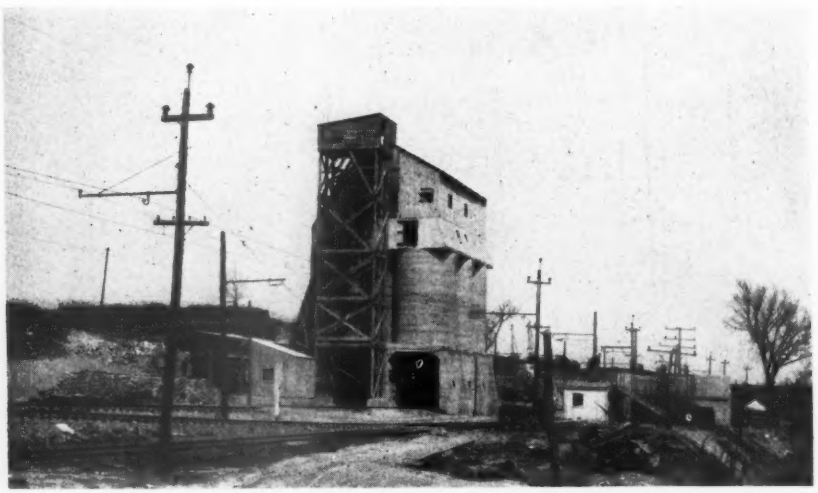




Left, looking down the tracks from the plant. Right, close-up of the limestone quarry operation

by No. 8 electric blasting caps with desired length of wires. The shooting is being done directly off of a 440 volt, 3 phase, 25 cycle current.

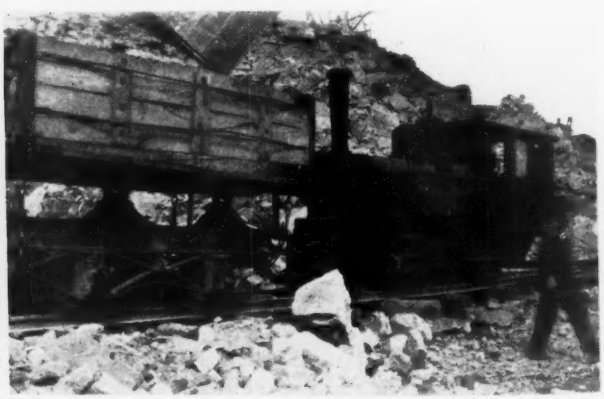
In the quarry operations proper a track type 70C Bucyrus steam shovel is used for loading stone into 4-yd. square-box two-way, 36-in. gage cars, which are handled from the mill to the steam shovel by an 8x10-ft., six-wheeled, geared-type Davenport locomotive. This locomotive spots a train of cars above the crusher where it cuts off from them and picks up a train of empties. The loaded cars are handled entirely by gravity, stopped at the proper position at the crusher, dumped and then are handled by gravity to an empty car spur, where the locomotive picks them up after spotting another train of loaded cars above the crusher. This operation is simply the reverse of an incline proposition, as the cars instead of being pulled up an incline are dropped down by gravity for discharge into the crusher.



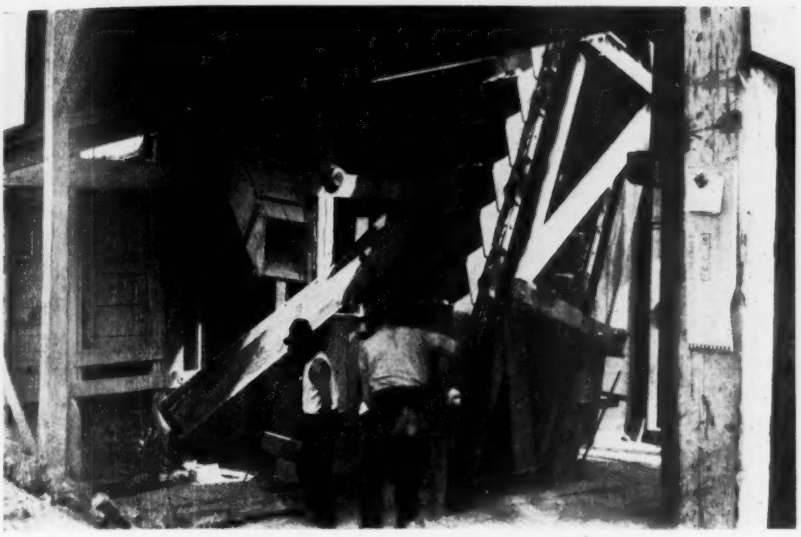
A very neat-appearing and well-constructed plant houses a No. 7½ breaker and No. 5 recrusher with the screening system

The mill or crushing plant consists of a 7½ Austin crusher with a No. 5 Gates rebreaker. All machinery is operated by individual drive motors of the induction type, 440 volt, 3 phase, 25 cycle power being furnished by the Waterloo, Cedar Falls & Northern Railway Co. The current is received at the plant at 44,000 volts, but is transformed by means of transformers to the proper voltage for the motors. The stone is elevated from the crusher pit by continuous bucket elevator with 20x12x 18-in. pitch buckets. It measures 88 ft. 6 in. centers, inclined at about 70 deg. This bucket elevator was manufactured by the Link-Belt Co. and installed about one year ago when the plant was rehabilitated. From the head of the above elevator the flow of stone is divided into two 40 in. by 20 ft. revolving screens and after proper separation the stone is deposited into six reinforced concrete silo type bins, having a capacity of approximately 1400 tons.

The finished stone is loaded into railway cars on two tracks underneath these bins and considerable expense and energy was expended upon a gravity track system for the handling of loaded and empty cars when the plant was rehabilitated. Empty



Left, view of the quarry face. Right, close-up showing types of locomotives and dump cars in use



The stone is elevated from the crusher pit by a 20x12x18-in. bucket elevator

cars are placed above the plant over a cross-over from the main track of the traction line with no interference, whatsoever, to the loading and handling of cars, and the loads are dropped down by gravity onto two loading tracks, which, approximately 100 ft. below the mill converge into one storage track from where the cars are pulled from the opposite end without interfering with the plant operations.

The company has installed at this quarry a modern office and supply room where a stock of bolts, babbitt metal, tools, electrical supplies, oil, etc., are accurately kept account of and checked out to the men upon request and proper authority.

While at the present time the old blacksmith and machine shop is being used, new equipment in the way of a drill press, power grinder, oxweld acetylene cutting and welding equipment have been installed and all are under the supervision of a competent mechanic.

Owing to the quarry being located nowhere near a town, it has been necessary for the management to provide housing and feeding facilities for practically every man employed, and while comfortable quarters and good board are now being furnished, additional quarters are constantly being provided for. Walks and streets are being laid out and outside lighting of the property will soon be installed.

Promoting a New Gypsum Mill in Utah

Projectors Visit Sigurd Plant for Facts to Justify New Venture

"ON October 11 a party of officials of the newly incorporated plaster and cement company, accompanied by the editor of the *Record* [Cedar City, Utah] made a trip of inspectoin to the Sigurd plaster and cement plant and the quarry from which the raw material is taken for making into finished product.

"Upon arriving at the Sigurd mill we found it in operation, running night and day, and producing on an average of 50 tons of finished products every 24 hr. The mill can be speeded up to a capacity of 75 tons in the spring of the year when the water supply is at its highest point, but in the fall of the year, when the water is at the lowest point, the capacity stands at about 50 tons per 24 hr.

"The manager of the mill took the party through the various departments and showed the numerous stages of refining that the gypsum used must go through before it is finished and ready for shipment.

"We were told that the previous month the mill running at the 50 tons capacity netted a profit to the company of several thousand dollars besides paying the overhead expenses of operation and the salaries of the 30 or 40 men now employed. We were also informed that the call for the product was insistent and the demand more than the supply could take care of, and that orders for the product were stacked up in the office that would keep the mill going for a year at least.

"After going through the mill the party was then taken two miles distant to the quarry of gypsum where we found a number of men employed blasting and breaking up the raw product for transportation by team to the mill. The raw material was found to be but slightly less in purity to that found here. The gypsum found at Sigurd tests up to 97.8 per cent pure, while that in Coal Creek Canyon tests up to 98.7 per cent pure.

"The deposit, although a splendid one, is not more than one-fourth as large as the one located in Coal Creek Canyon, and is not as easily accessible.

"The Mammoth Plaster and Cement Co., when it builds its mill at the deposit in Coal Creek Canyon, will not have to haul the raw product as the mill will be built immediately adjoining the deposit. The saving of a team haul of two miles will mean that the plaster can be produced at about 33⅓ per cent less cost in Coal Creek Canyon than plaster is being produced for at Sigurd.

"The Sigurd mill for the past year or more has been making for the stockholders several thousand dollars per month, which is used to pay dividends, and after paying dividends the past year of 10 per cent on the dollar, the company now has already for the next dividend some $55,000 in the treasury.

"Already the local company has assurance of orders for plaster from firms doing business on the coast that will keep the mill that will be erected next season busy for a number of months, and as the coast as well as Utah, Nevada, and Arizona are being built up rapidly and the outlook for building warrants the assertion that it will maintain for several years, there is but little doubt the proposed plaster and cement mill that will be erected by the Mammoth Plaster and Cement Co. will be a dividend payer.

"We have been informed by pretty good authority that when the mill is built and in operation, a spur of the Cedar-Lund branch of the Union Pacific railroad will be built to the mill and continued on to the Jones Bulloch coal mine. This will mean that transportation will be easy for the company, and the cost of producing and shipping to market considerably less than the Sigurd company is capable of producing the products for; hence the local company can easily compete with any similar plant in the West.

"The Mammoth Plaster and Cement Co. is headed by Doctor Macfarlane as president, and Mr. Poulson, of Salt Lake City, vice-president; Doctor Petty, J. G. Pace, and Lehi Jones, of this city, as directors, and Mr. Johnson, of Richfield, as director. Each member of the board is a man well known to the public generally, is reliable, and has the confidence of the people, and it is a foregone conclusion that they will 'put over' one of the best paying propositions in the state."—*Cedar City Record.*

Rotary Cutters for Sand and Gravel Dredges

A Device for Insuring a Regular Feed of Solids to the Pump Which Also Protects It from the Entrance of Large Stones

By Jean M. Allen
Consulting Engineer, Chicago

WITHIN the past few years there has been a tremendous increase in the output of sand and gravel for concrete and road building purposes and it is generally recognized that, where a sufficient supply of water is available, pumping is the cheapest and most satisfactory method of excavating, transporting and elevating materials at one operation, preparatory to washing and screening them. In comparison with past practices, the present trend is toward plants of larger capacity with improved screening, storing and loading apparatus. With this has come the demand for a dredge with auxiliary digging equipment that will be capable of a maximum continuous output with minimum possibility of shutdowns and that will effectively excavate any materials encountered. Most of the existing dredges are equipped with plain suction nozzles without any means of loosening or disintegrating the materials unless it be the system of water jets occasionally employed. This is a fairly satisfactory system when the sand and gravel particles are loose and flow easily, conditions found in some pits and in the bottoms of running streams, but when the excavation is from a pit where the materials are compact or cemented, or where large stones and boulders or layers of clay are encountered, a cutting device of some sort is of great advantage and in some cases absolutely indispensable.

The plain suction type of dredge is comparatively simple, consisting of a hull on which are mounted the dredging pump and the prime mover. The suction pipe passes over the side or end of the hull down to the bottom of the river or pond, usually terminating in a bell shaped suction mouth-piece. Flexibility of the pipe is secured by a section of rubber suction hose where it passes over the edge of the hull. It is raised and lowered by a tackle suspended from a boom over the end of the boat operated by a single drum hoist. The boat is moored and maneuvered by shore lines taken to a winch head on the hoist, or handled by hand on small dredges.

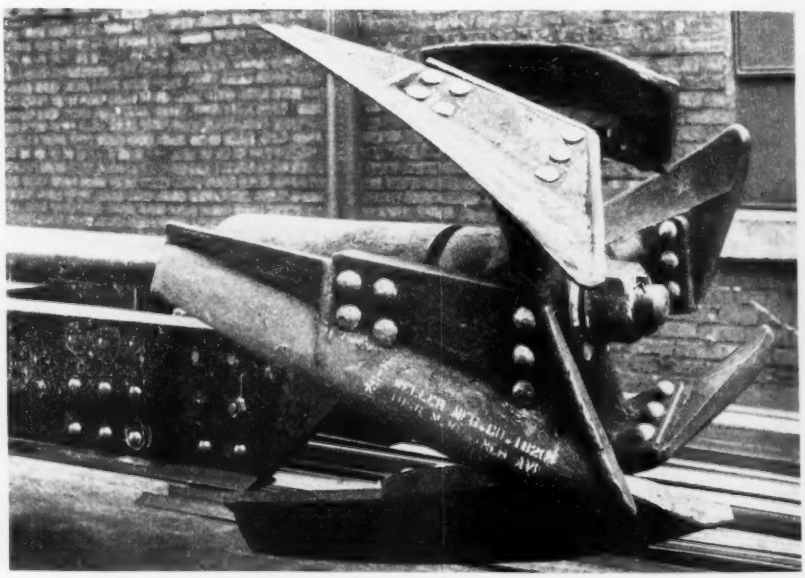


Fig. 1—An open cutter shown on the end of its supporting ladder

The digging devices employed as agitators, or cutters, may be divided into two general classes: The first consists of an endless chain or screen which passes over the mouth of the suction pipe with spaces sufficiently small to exclude all stones too large to pass through the pump, and fitted with teeth or fingers which loosen the material so that it can be picked up by the water entering the suction pipe. The second type consists of a frame or "ladder," usually of structural steel, mounting a rotary cutter, its driving shaft and power mechanism. The upper end of the ladder is attached to the hull by cast steel trunnions or hinge castings. Its lower end terminates in a steel head casting that contains a bearing for the end of the cutter shaft and supports the lower end of the suction pipe which projects into the cutter. The cutter is driven by a heavy axial shaft extending up the ladder to the driving gears located on the upper end. For driving the cutter mechanism the prime mover may be directly connected to the driving gear train either on the ladder or on the deck by employing a universal joint. Steam engines or electric motors are the most satisfactory power units for this classification. It is not uncommon to furnish the power to the gear train by pulley arrangement to the prime mover. This necessarily has to be done when oil engines are used.

Most plant operators are fairly familiar with the first type, but the second type has not had the recognition among sand and gravel producers to which its advantages under certain conditions entitle it. But the rotary cutter is no innovation, as it has

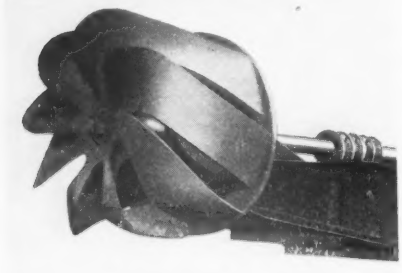


Fig. 3—Rotary cutter of a one-piece casting designed to exclude stones

Left—Fig. 2 shows the open cutter and ladder in Fig. 1, as it appears mounted, on a dredge. Right, Fig. 6—An electrically operated 15-in. dredge with open type cutter

been used for many years by numerous dredging contractors on the ocean coasts and the Great Lakes. It has reached a high state of development and certain forms are ideally adapted for sand and gravel excavation.

The cutter dredge requires a somewhat

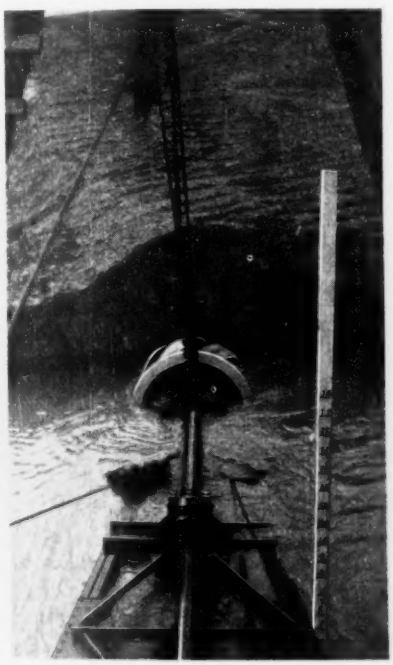


Fig. 5—This shows a cutter of the type shown in Fig. 3 in operation

larger hull and more machinery than the non-cutter type. The pump and its power driving unit are the same, but on a cutter dredge the suction pipe is carried on a rigid ladder of steel or wood construction mounted on trunnions at the bow of the hull with a cutter on its lower end into which the suction pipe projects. The use of spuds is an essential feature, for it is difficult to hold the cutter properly into the bank without them. This is particularly true of the rotary cutter equipment. Two spuds are attached to the stern of the hull, and in operation the dredge is swung about one of these as a pivot by swinging lines passing through blocks attached to the ladder near the cutter. The second spud is used in advancing the dredge in the cut. Operations can be made by dredges having only one spud, but more positive advancement in the cut along with better control of the dredge is found where two are used. A five-drum hoist is required with this arrangement. One drum is used for raising and lowering the suction ladder, two for swinging the dredge and two for hoisting the spuds. A winch head is usually provided on one of the drum shafts for handling pontoon lines and necessary temporary hoisting work.

There are various designs of rotary cutters and all have their points of superiority in adaptation to the particular field for which they are best suited. Figs. 1 and 2 show an open type cutter and its supporting ladder. The cutter is built up of a carbon steel spider to which manganese steel blades are riveted. This type of cutter is very efficient in material that is not too hard and that has no stones or boulders too large to pass through the pump. When there is a considerable percentage of oversize material, the closed type of cutter is to be preferred. Fig. 3 shows a type of cutter which is a one-piece casting usually of manganese or nickle chrome steel. For excavating clay or

Fig. 4—A toothed cutter designed for digging through hardpan and cemented gravel. It will also exclude large stones

light material it has five or six blades, but when working in large gravel or boulders it is fitted with eight, the openings between the blades being small enough to exclude any stone that will not pass through the pump. The head casting is provided with a back disc so that all water and solids must pass through the cutter blades. When very refractory material, such as cemented gravel, indurated clay or rock strata are encountered, a tooth cutter is used with great success. These teeth are of tool or alloy steel and are renewable. Fig. 4 shows this design. Fig. 5 gives a good view of a cutter in operation, and Fig. 6 shows a 15-in. electrically operated dredge with an open type cutter.

The usual method of operating a dredge equipped with a rotary cutter is to swing the dredge across the pit, pivoting on a stern spud, taking a cut the length of the cutter and from 2 to 4 ft. in depth, depending on the size of the dredge and the character of the material. The swinging blocks through which the swinging cables pass are attached to the ladder as close to the cutter as possible; thus the swinging force is applied directly at the cutter, relieving the hull and ladder of all strains such as are induced when the dredge is swung from the deck.

It is the benefits derived from the installation of a rotary cutter that justify its use. Some of these are:

It will break up and convey to the suction pipe any hard materials encountered such as compact sand, cemented sand or gravel, or strata of tough clay or gumbo, which frequently overlay the choicest deposits of sand and gravel.

A cutter of the proper design, with a minimum opening between the blades, will act as a screen and automatically reject all stone too large to pass through the pump, thus avoiding the usual delay incident to stopping the pump, doing the necessary dismantling work and removing the obstruction.

Insures Uniform Feed

The use of a cutter insures a uniform feed of materials to the pump. On a dredge equipped with a plain suction nozzle, unless the operator is unusually skillful, the materials are usually fed into the suction pipe *intermittently,* an excessive percentage of materials is pumped for several minutes followed by a period of clear water to keep the solids from settling and clogging the discharge pipe line. This results in a much lower hourly output then that of which the pump is capable of producing with the rotary cutter. Feeding materials to the suction line (with a rotary cutter) is accomplished by a combination of the rotation of the cutter and the movement of the dredge by the swinging lines, and as both these are under the control of the operator, he is able at all times to keep the solids entering the suction pipe at the maximum amount that the pump can handle and at the same time maintai nthe proper velocity of water and materials in the discharge line. Also with this method there is not so much danger of choking the pump and pipe lines by the caving of the bank ahead of the dredge.

The non-cutter dredge excavates by digging a series of holes while the cutter dredge sweeps the pit in a series of uniform cuts leaving practically a level bottom. Unless there is an unlimited depth of good solids available this is a decided advantage, as the materials can be excavated to the lower limits of the deposit.

Because of the fact that the cutter dredge pivots on a stern spud, all digging strains are removed from the pontoon line, making it easier to keep the joints tight, and because of the reduction of strains, a cheaper and more flexible pontoon line construction can be used.

In order to insure the successful operation of the dredge, a careful study should be made of all the conditions encountered so that the right type of cutter may be selected. Among the particular advantages of the rotary cutter are its great digging power and low maintenance costs. A well designed cutter unit will perform satisfactorily over a long period of operations with minimum maintenance costs. This initially insured because of its simple and rugged construction. The parts receiving most severe abrasive wear are easily repaired and replaced with little expense.

Benton Gravel Plant Expands Operations

REPRESENTING an investment of more than $200,000, the new plant of the Ball Benton Gravel Co., at Benton, has begun operations.

J. J. Ball, pioneer in the gravel industry in Arkansas, is president of the concern, and W. D. Cammack is vice-president. C. M. King is secretary of the company. The Ball Benton Gravel Co. is a closed concern and is owned by Mr. Ball and Mr. Cammack.

The company, at its old plant at Benton, has been supplying railroads and road districts throughout the state with gravel and other ballast material for the last 10 years.

At present the plant is working overtime filling an order for 700 miles of ballast for the Missouri Pacific railroad. More than 100 men, augmented by three locomotives and three steam shovels, are working on the contract.

The company's present capacity is a daily output of 100 cars in 10 hr. With ample railroad connections the company has a storage capacity of more than 200 cars on sidings and switches. The Benton and Saline River railroad, a short line steam road, is owned by the company.

The product of the Ball Benton Gravel Co., unlike much of the commercial gravel supplied by quarries in the state, is of a clear white type. A washing process is responsible for the high-grade product. Two 10-in. pipe lines carry 1200 gal. of water a minute from Saline river to the washing pits of the plant, a distance of 6000 ft. An emergency auxiliary line brings another water supply from Depot creek.

The plant is electrically driven throughout and equipped with the latest engines and motors. The operation of the plant is simple although thorough. The gravel is loaded into dump cars by a steam shovel and is dumped into a hopper pit. From this pit it is carried by a conveyor belt to a scalping screen, where the product is sifted and discharged into a rock crusher where the gravel is ground into the standard size. It is then put through a washing process and discharged into cars ready for distribution.—*Little Rock (Ark.) Democrat.*

Party Investigates Silica Sand Deposits

AT the invitation of the Sedalia Chamber of Commerce, Walter C. Pond, a representative of the State Geological Survey, located at Rolla, Mo., is in Sedalia for the purpose of making a survey of the silica sand, clay, and limestone deposits in this vicinity. In company with A. C. Harter, president, and C. H. Smith, secretary of the Chamber of Commerce, J. F. McDougal, local freight agent for the M-K-T Railroad Co., and W. W. Russell, he made a trip to Clifton City yesterday and examined silica sand deposits and limestone in that neighborhood.

He also inspected deposits in Forest Park, on Springfork Creek, and on Flat Creek, south of this city, taking samples which will be analyzed, and a complete report of his findings will be made in a short time. Mr. Pond and Chamber of Commerce officials will continue their investigations today for the purpose of making a thorough survey of the sand and limestone deposits.

Mr. Pond, when interviewed last night, stated that "the sand around Clifton City is a very pure sand made up of grains of quartz, and it is probably the same sandstone formation that has been mined in Crystal City and other places that is being used for glass sand." Mr. Pond was sent out by State Geologist H. A. Buehler.

"My examination, together with results of examination made by other members of the survey in the past, would seem to show that the various deposits in that neighborhood are not continuous, and it is not likely that any one of them is very large size," Mr. Pond stated. "That cannot be told definitely, however, without prospecting the deposits either by sinking pits or by churn-drilling," he added.

South of the water works the party found some sandstone, known as the Phelps sandstone, which is geologically a later sandstone than the St. Peter. It contains more impurities and is hardly fit for glass-making, except for a lower grade of glass. Mr. Pond was well impressed with the Sweeny quarry, which is owned by the M-K-T Railroad Co. —*Sedalia (Mo.) Capital.*

Quarrying Asphaltic Rock in Texas

Uvalde Rock Asphalt Co. Operates a Large Quarry of Limestone Impregnated with Bitumen, Superior to the European Product and Used for Pavements in Many Southwestern Cities

THERE are comparatively few successful asphaltic rock operations in the United States, although the value of this material for paving has long been recognized. Importations have been made into the United States since 1872, but the use of the material has been practically limited to coast cities in which only the ocean freight had to be met. The development of the rock asphalt industry in the United States practically began with this century and did not attain much importance until after the war.

The Uvalde Rock Asphalt Co., of San Antonio, Texas, is operating a deposit that has been known for many years. A New York company tried to operate it more than

A stock of 40,000 lb. is kept on hand in the powder house

30 years ago, extracting the bitumen for making paints and varnishes. A little of the crude material was used for making pavements, but there was not much of a market for paving material in Texas at that time. It lay dormant until 1910, when J. B. Smyth, of Beaumont, Texas, who saw approaching the "hard roads" and paved streets of the present day, began to experiment with the material and to produce it in small amount. Production increased gradually, until 1918, when it made a tremendous increase, and this increase has been more than maintained up to the present time.

Asphaltic Rock

Rock asphalt (asphaltic rock would be a better term) is not to be confounded with oil shale. All of the light volatile substances have long ago been extracted from the original, or primary, oil bearing rock, so that only limestone impregnated with bitumen remains. How true this statement is, is shown by the following chemical analysis:

Abietic Series		0.666%
Petrolene	Asphalt	10.970%
Asphaltene	Asphalt	6.066%
Residue		82.156%
Total		99.858%

Naturally, a material that has been weathered for perhaps millions of years has extremely high resistance to the effect of water and to erosion, and it is this which

Asphaltic rock after blasting. This is part of a creek bed on the property and the rock has been under water for uncounted years. The hat is to show that the deposit is in Texas

The quarry is worked by benching, jackhammers and churn drills being used. The picture gives a fair idea of the thickness of the deposit and the scant overburden to be removed

Dragline stripping overburden. This has to be done only in parts of the quarry

Handling fines with a scoop or boat. One scoop is filled by the shovelers who clean up the ground while another is being emptied

A locomotive crane is used for cleaning up and working around the yards

gives rock asphalt its value as a paving material.

The company's quarries are in Uvalde county, Texas, about 7 miles south of Cline on the Southern Pacific railroad. The deposit is very large and this company alone owns and controls 20,000 acres in the heart of the deposit.

Nearly $250,000 has been spent by the company on equipment, which is a very considerable sum when one considers the simplicity of the operation and the fact that there is no special preparation of the product. The equipment includes three steam shovels, two 70-C Bucyrus and one Browning construction 1-yd. shovel, a Monighan dragline excavator with 100 ft. boom, used principally for stripping, three locomotives, a Shay 45, a Shay 75, and a 60-ton Baldwin and a No. 10 gyratory crusher which can handle 100 tons an hour.

There are 16 jackhammer drills, operated by compressed air, from an Ingersoll-Rand and a Laidlaw compressor, and 22 Western Wheeled Scraper dump cars which bring the quarried rock to the crusher. These are loaded by steam shovels as shown in accompanying pictures.

The system of quarrying adopted is that of benching off, after the ground has been stripped of the top soil, where stripping is needed. This is very well shown in the picture of the quarry operation, the broken rock lying in the foreground, the bench above where the men are working with jackhammer and churn drills and the top bench in the background.

A No. 10 gyratory crusher puts through 100 tons an hour, breaking to shipping size

There are about 125 men employed at the quarry and these, with their families, make up a fair-sized town of more than 500 people. The employes are Mexicans for the most part and the company has gone to unusual lengths to insure their comfort and well-being. Houses are rent free to employes and supplies are furnished them from the company store at a reasonable price. Well fed and contented labor has a lot to do with the success of any operation of this kind.

A hospital is maintained under the charge of the company's resident physician and it has a completely equipped operating room. A regular trained nurse assists the doctor.

After blasting steam shovels load the broken rock into dump cars which carry it to the crushing and shipping department

The company owns its own railroad cars and locomotives and the trackage to main line. Right, the chain conveyor system that takes the rock (10-in. and under) from the crusher and loads it on the cars

A public school is maintained with grades from the first to the eighth, thus rounding out the civic functions of a happy and contented community.

The railroad which connects the quarry with the Southern Pacific at Cline station is also owned by the company and 25 cars of asphaltic rock are shipped over it every day.

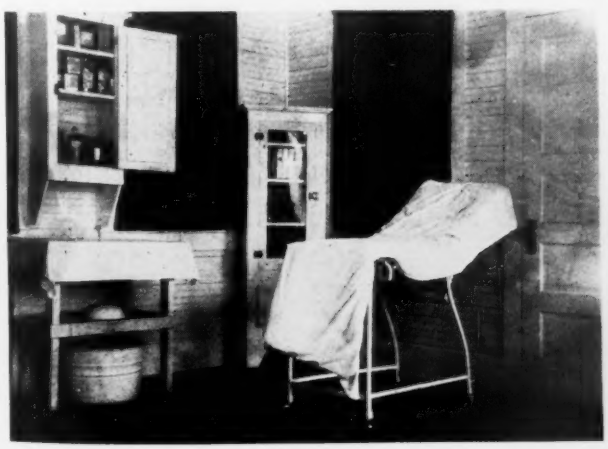
There is no further preparation of the material at the mine than to break it into 10-in. lumps, which is done by an Austin No. 10 gyratory, and it is in this shape that the rock is shipped to the cities where it is to be used for paving. In these cities it is prepared for mixing by being still further broken until it all passes a ½-in. screen. For the hot mixture it is then heated and passed into a drum with enough parafine base oil to soften it and give it the desired penetration. The mixture is then hauled to the street and spread to the desired thickness and rolled and cross rolled by a steam roller until it has attained the necessary compression. Four hours after the hot mix has been laid the street can be opened for traffic.

A similar method is employed for the cold mix except that a cold mixture is made with oil that has an asphalt instead of a parafine base.

The principal use of this asphaltic rock is that of paving city streets, but it has also a considerable use for floors in stables, warehouses and other buildings of the kind where there is a great deal of heavy wear. It is especially serviceable for the flooring of stables as the chemical action of the ammonia and other animal excretions has no effect upon it whatsoever.

Rock asphalt has had a more extended use in Europe than in the United States as a paving material. It was first applied in Switzerland in 1849, and since that time it has been used in most of the principal European cities. There are many important deposits in Europe and Boorman's "Asphalts, Their Source and Utilization"

Some of the company's 125 employes. Houses are furnished rent free and supplies furnished from the company store at a reasonable price. The "town" has about 500 inhabitants



The resident physician and surgeon has a well-equipped modern hospital and a trained nurse for his assistant

gives the following comparison with some of the European deposits and the Uvalde deposit:

ANALYSIS OF CRUDE ROCK ASPHALT

Source of Rock Asphalt	Pure Bitumen Percent	Carbonate of Lime Percent
Lobson, Germany	12.31	71.43
Limmer, Germany	14.30	67.00
Val de Travers, Switzerland	10.15	88.40
Ragusa, Italy	8.92	88.21
Mons	10.20	84.63
Pont du Chateau	11.40	77.52
Uvalde Rock Asphalt	12.00	88.00

Looking down on the tunnel under the first of the ground storage layouts

Graham Brothers' Crushing Plant on Santa Catalina Island

New Plant Under Construction Will be Most Spectacular on the West Coast

GRAHAM BROTHERS, INC., general contractors and sand and gravel producers of Long Beach, Calif., are building a rock-crushing plant on Santa Catalina Island, about 27 miles off the coast, which in some respects will be the most notable operation of its kind in the world, and certainly will be the most interesting and spectacular one on the Pacific coast.

The most notable features of operation are the immense deposit of rock available—literally a whole mountain—the great elevation of the primary crusher above the screening plant, the most remarkable storage facilities for both unfinished and finished stone, and the unusual shipping facilities, direct from storage to sea-going barges, which will ply the coast from San Diego to Santa Barbara.

General Layout

As practically every one knows Santa Catalina Island is a series of mountain peaks which stick out of the Pacific ocean about 27 miles off the coast of San Pedro and Long Beach, which are the seaports nearest Los Angeles, San Pedro being part of the city of Los Angeles. The entire island is owned by William Wrigley, the chewing gum magnate, and is largely used as a pleasure ground and resort. The new crushing plant is being erected on Pebble Beach, about two miles southerly around the shore line from Avalon, the principal port on the island.

The quarry will be on the mountain side behind the plant. The rock is a species of trap rock of probable volcanic origin, dense, strong and breaking into sharp fragments. One's first impression is that quarrying operations will commence at a very considerable elevation above the plant and hence leave a vast amount of stone unavailable, but the view from the water shows that the elevation of the primary breaker is a hardly appreciable step in the tremendous deposit of rock above and behind.

The general layout is a straight-line design from primary crusher on the mountain side to the end of the conveyor gallery on the wharf. The rock moves forward, by gravity, for the most part; where belts are used they operate usually as level conveyors.

The primary breaker is a 48x60-in. Traylor jaw crusher, which was being warped up the mountain side when the accompanying views were taken. It will be placed 254 ft. above sea level. The discharge from this initial crusher will go to a side-hill, concrete hopper of 1000 cu. yd. capacity.

General view of the Graham Brothers' crushing plant on Santa Catalina Island, California. All construction to the left, including the bins, is temporary, to provide for crushing beach pebbles while the quarry is being opened

Loading a sea-going barge at Santa Catalina Island

General view of part of plant from beach

Steam shovel temporarily loading beach pebbles for crushing

Conveying beach pebbles to the crushing plant

Site of the upper ground-storage; top of concrete tunnel at right

No. 16A Telsmith crusher in temporary pebble-crushing plant

From this storage the rock is fed by a 42x12-in. Stephens-Adamson feeder and a 36-in. belt conveyor (with ball-bearing carriers), 75 ft. c. to c., into a 60-in. by 18-ft. rotary scalping screen, equipped with manganese-steel screen plates, dust-jacketed to reject ¼-in. material and less. The material passing the dust-jacket may be put into storage, or sluiced away and wasted.

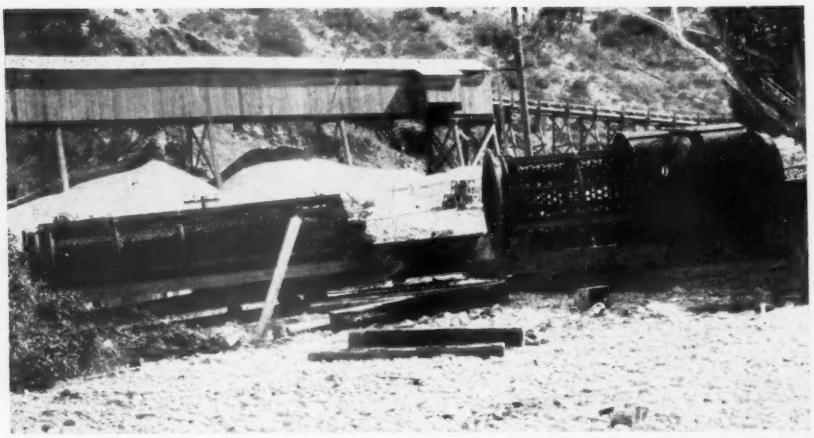
Material failing to pass the scalping screen goes by gravity to a 16A Telsmith gyratory crusher placed at an elevation of 158 ft. above sea level—nearly 100 ft. below the primary breaker.

Following the secondary crusher is a 48-in. by 16-ft. rotary screen with 2-in. perforations, which discharges to three side-hill bins of about 300 cu. yd. total capacity. The material passing the 2-in. perforations is fed out of one or more of these bins to a 48-in. by 18-ft. sizing screen.

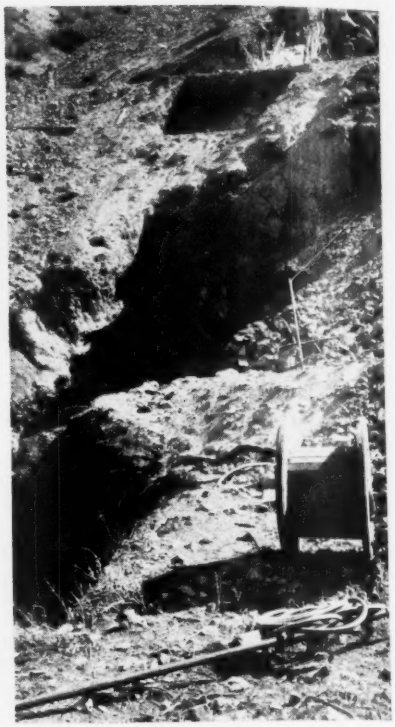
The oversize is fed from its bin or bins to a No. 4 Telsmith reduction crusher placed at an elevation of 110.5 ft. above sea level. From the crusher it is conveyed by a 24-in. belt 67.6 ft. centers to the 48-in. by 18-ft. sizing screen, which is at an elevation of 102.5 ft. above sea level.

A four-compartment bin below the screen serves merely to collect the various sizes temporarily or as a feeder to the ground-storage system. From these compartments a 24-in. belt conveyor, 60 ft. centers, removes any size of stone desired and places it in ground-storage by means of a 24-in. conveyor belt over a trestle 282 ft. long.

This storage pile is over a concrete tunnel, the top of which is at elevation 40 ft. above sea level. Inside the tunnel is a 24-in. belt, 560 ft. centers, which withdraws stone of any particular size to another storage pile, from which it is withdrawn for shipment by a 36-in. belt conveyor in a concrete



Final ground storage—equipment waiting its turn in foreground



Excavations in hillside for crusher foundations

Scalping screen and jaw for 48x60-in. crusher

Warping a 48x60-in. jaw crusher up the mountain side

A 48x60-in. jaw crusher casting being moved to an elevation of 254 ft. above sea level

tunnel, 310 ft. centers. This conveyor comes out of the tunnel on to a trestle over the pier to the 36-in. shuttle conveyor on the wharf, 150 ft. from shore. The shuttle conveyor is 50 ft. c. to c., with approximately 100 ft. of travel, loading a scow at either end of the T-shaped wharf.

It will be seen from the foregoing description that the foremost feature of the plant is the very unusual arrangements for storing and rehandling large tonnages of finished stone. These are provided to take care of plant-run sizes while filling large orders of any particular size or sizes of stone. For example, the higher storage pile may stock four or more sizes, while only one of these may be drawn upon for the stock pile nearest the wharf, which is the only one tapped for shipment. This allows the accumulation of several thousand tons of uniformly sized stone, which can be loaded into barges very rapidly by means of the 36-in. belt.

Owing to the necessity of loading barges

of several hundred tons capacity each, as rapidly as possible, it is, of course, desirable to have a loading speed much faster than the rate of plant production. The production can go on continuously for 24 hr. a day, if necessary, at a uniform rate, and all the material can be stored, while several large loads of one-size material can be drawn from storage and shipped without affecting the normal operation of the plant.

For the time being, before the quarry is opened, a steam-shovel is operating in the deposit of beach pebbles, which are being crushed and screened in a temporary plant. This temporary plant is using the 16A Telsmith crusher, which will subsequently serve as the secondary crusher.

The screens and conveying equipment are being furnished by the Stephens-Adamson Manufacturing Co., which is also supplying the designs.

Dissolves Cement Manufacturers Protective Association

Declared to Be a "Combination in Restraint of Trade," in Spite of Manufacturers Showing That Uniformity of Prices Will Result Under Present Conditions

A DECREE dissolving the Cement Manufacturers' Protective Association, consisting of 19 of the largest manufacturers of cement in the country, was granted recently by Federal Judge Knox. Proceedings began in July, 1921, when United States District Attorney Hayward instituted two actions against the association. One was a criminal action, which involved all of the members of the association and 44 individuals, and the other was an action in equity which sought the dissolution of the alleged illegal combine.

The trial of the criminal case resulted in a disagreement of the jury and it was later agreed that in the civil action the testimony taken in the criminal trial should be accepted as the total amount of evidence at the disposal of the government. Argument was heard about a year ago, but the decision was delayed because of the illness of Judge Knox. Colonel Hayward and David A. L'Esperance, a special assistant to the attorney general, said that an appeal from Judge Knox's opinion was unlikely because appeals in such cases had fallen into disfavor since the United States Supreme Court had declined in several important cases to reverse the lower courts.

For the purpose of showing the importance of the cement industry, the government stated in its complaint that it entered into competition with lumber, steel, brick, stone and all other products used in building enterprises "from a small piece of sidewalk in the rural districts to the subways and skyscraping office buildings in the cities; from a water trough to an ocean-going vessel." Statistics were introduced to show the great increase in the production of portland cement during the last decade.

To carry out its plan of controlling prices the government alleged that sectional organizations were formed in this city and in Chicago, Dallas, Kansas City, Mo., and Atlanta, and that through its extensive business interests the members of the parent association manufactured upward of 90 per cent of the quantity produced in the northeastern section of the United States.

Alleged "Gentlemen's Agreement"

At the meetings of members of the association, according to the government's complaint, an agreement "sacred to gentlemen" was openly advocated; that higher prices were persistently advocated; that curtailment of production was freely and openly discussed and advocated, as well as withholding cement from the market, and that uniform costs accounting systems were frequently advocated and finally accomplished. What the government asked for and what the Court has granted was a decision that the defendants were engaged in carrying out an unlawful combination and conspiracy in restraint of trade and commerce in portland cement and that the Court "adjudge and decree the Cement Manufacturers' Protective Association and each of the elements composing it, whether corporate or individual, to be an unlawful instrumentality."

The defendants contended that there was no formal agreement to follow the practices of other manufacturers, but Judge Knox stated that such a result would follow and that: "Manufacturers do naturally follow their most intelligent competitors if they know what these competitors have been doing." Another part of Judge Knox's opinion reads:

Judge Knox's Decision

"I think that real competitive effort tended to become more and more feeble. That manufacturers by reason of the exchange of statistics, were equipped to regulate their production, and by common consent and a concert of action, did so to the end that the cement supply would at all times be a lap or two behind the demand, and this created higher prices.

"In enabling this to be done the association, its officers and agents, together with its membership materially limited the full and free operation of the contending forces of competition to which the public, under the Sherman Law, is entitled, and unreasonably affected interstate trade and commerce. The Government may have the decree asked for."

The officers of the association are E. P. Alker, president; C. Raymond Hulsart, vice-president; Miss M. B. Phalen, secretary, and Marion S. Ackerman, treasurer.

The defendant corporations are: The Atlas Portland Cement Corporation, Allentown Portland Cement Co., Alpha Portland Cement Co., Bath Portland Cement Co., Coplay Cement Manufacturing Co., Dexter Portland Cement Co., The Edison Portland Cement Co., Giant Portland Cement Co., The Glens Falls Portland Cement Co., Hercules Cement Corporation, Knickerbocker Portland Cement Co., Lawrence Cement Co., Lehigh Portland Cement Co., Nazareth Cement Co., Penn-Allen Cement Co., Pennsylvania Cement Co., The Phoenix Portland Cement Co., Security Cement and Lime Co., and The Vulcanite Portland Cement Co.

In the prosecution of the case against the defendants the government was represented by James A. Fowler and Roger Shale, special assistants to the attorney general. If the defendants fail to discontinue the practices complained of they will be guilty of contempt of court.—*New York Times.*

Kansas Cement Firms Not Guilty of Combination

THE last echo of the protracted grand jury investigating of the hard road scandal two years ago died away when a jury in district court brought in an instructed verdict favoring five Kansas cement corporations charged with entering into an unlawful combine.

The case was brought to a sudden end when Sen. Carr W. Taylor, special prosecutor, followed a tilt with the court on a matter of evidence by announcing that the state rested.

Judge Fairchild, then instructed the jury to acquit the defendants: The Ash Grove Lime and the Portland Cement Co., the Monarch Portland Cement C., Lehigh Portland Cement Co., Bonner Springs Portland Cement Co. and the Fredonia Portland Cement Co.—*Kansas City Journal-Post.*

Promoting the Use of Cement in House Building

TEXTURAL uses of portland cement in house construction were graphically shown to members of Real Estate Board at their weekly luncheon in the private dining room of Tutwiler hotel recently, by a moving picture produced by the Atlas Portland Cement Co.

Many views of homes of stucco finish were portrayed in the film and for instruction, a plasterer produced each of the finishes. It was stated by Mr. Wiley of the Atlas company that the use of cement for stucco finish were unlimited, owing to abilities of the architect in producing new designs.

Big British Portland Cement Plant

Ship Canal Portland Cement Company Has a Well-Designed Plant and Exceptional Facilities for Shipping to All Parts of the World

THE actual work of the factory commences at Stanlow Wharf—the works' private wharf on its estate—a fine structure substantially built, which presents a frontage of about 1000 ft. to the Ship Canal.

[This is at Ellesmere Port, which is across the Mersey river from Liverpool.—Ed.]

The works site for the production of "England" brand portland cement was chosen because of its ideal situation for transit facilities. It stands alone for the opportunities it enjoys for direct foreign shipment. Ocean liners of a capacity up to the maximum that can navigate the Ship Canal—say 20,000 tons burden—can be dealt with at the works wharf, where there is a minimum depth of 28 ft. of water at all times.

In addition to these facilities, the proximity to the ports of Liverpool and Manchester places these works in direct connection with all parts of the world, as ocean liners and other tonnage move to the works wharf there to be directly loaded.

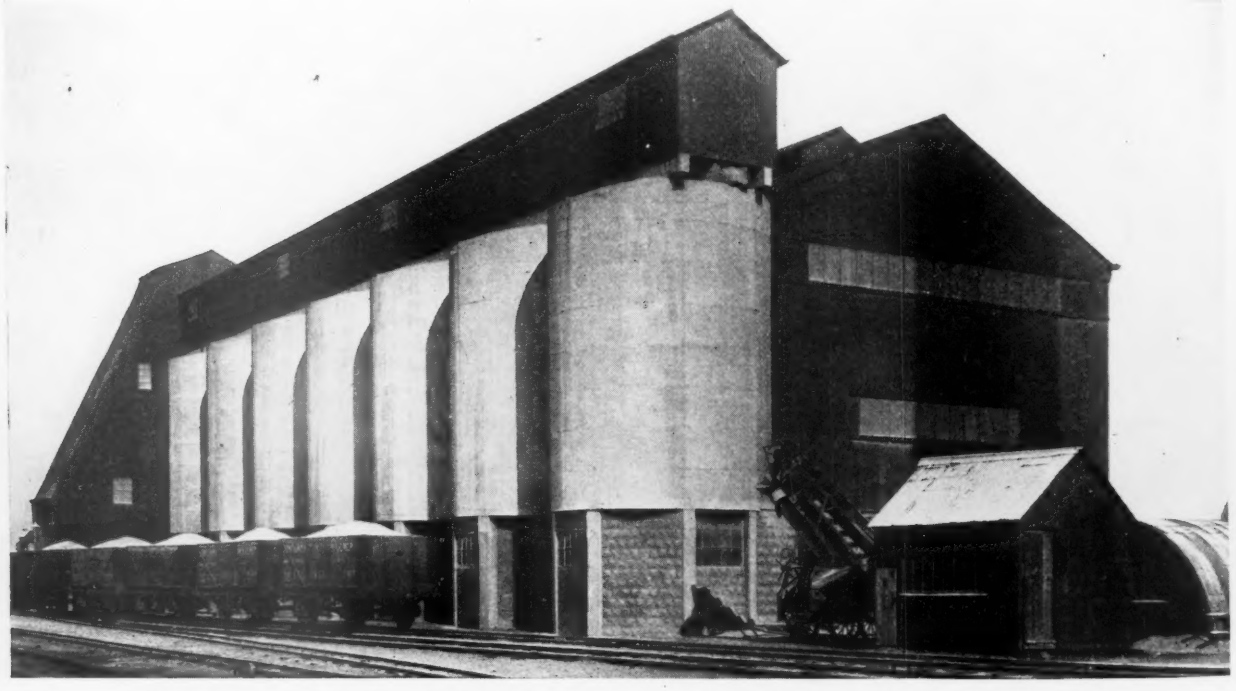
Exporters will see that these works are situated at the gateway of the densest manufacturing center in the world and will readily appreciate that, in addition to the other heavy commodities exported from the Ship Canal and the River Mersey, such as coal, coke, salt, steel, galvanized sheets, etc., they can combine portland cement and make up full cargoes of general merchandise with prompter shipment than can be secured elsewhere.

THE manufacture of portland cement is now an international business. The United States both exports and imports it in large quantities. British cement comes into competition with American cement on both coasts and in the broader world market, and for this reason this description of one of the most important of British portland cement plants (based on information furnished by the company) will interest our readers.

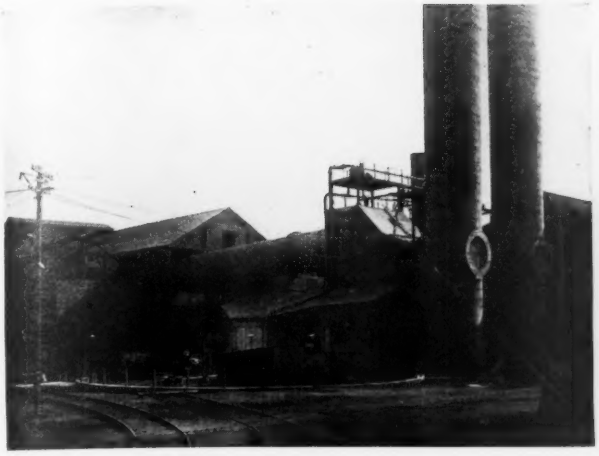
While the Ship Canal Co. supplies a large part of the market in the British Isles, its main business is drawn from foreign lands. The company publishes a list of countries to which it exports cement, including such far-away places as Demerara, Nigeria and Sudan.

The wharf is equipped with electric and steam cranes. Being a sufferance wharf, custom clearances, including bonded goods and stores, are given at the works wharf, enabling tonnage to sail direct to and from foreign ports.

To this wharf is brought the limestone in coasting vessels of various sizes and as work is carried on day and night there is no delay in discharging. Steam and electrically driven cranes equipped with special grabs quickly discharge the steamer, the limestone being carried to the storage bins by a series of belt conveyors running under the wharf to elevators serving belt conveyor systems running over the wharf storage bins. These bins have a storage capacity upwards of 12,000 tons. From the wharf storage bins facilities are provided for the conveyance of the stone to the factory or, if required, into the company's or other railway wagons or barges alongside the wharf. The bulk of the consignments from the quarry are, of course, used in the factory itself.

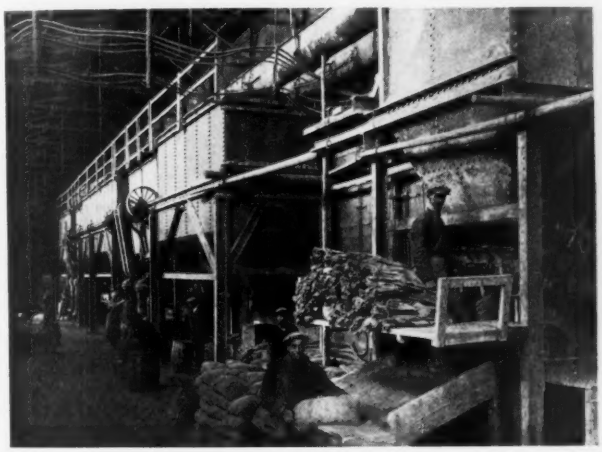


Exterior view of the plant showing the concrete raw material bins from which the limestone and shale are drawn in proper proportions

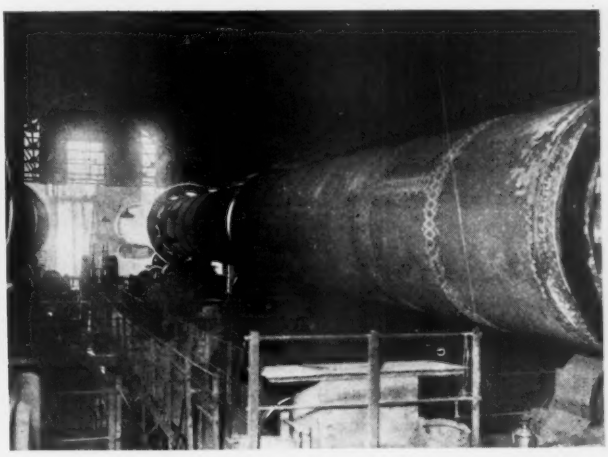


End of No. 5 kiln with stacks. Two of the slurry tanks are at left of stack. The house contains the three-throw slurry pump

The company's wharf is right at the works with 28 ft. of water. Ships with a mixed cargo can stop at the wharf to take on cement

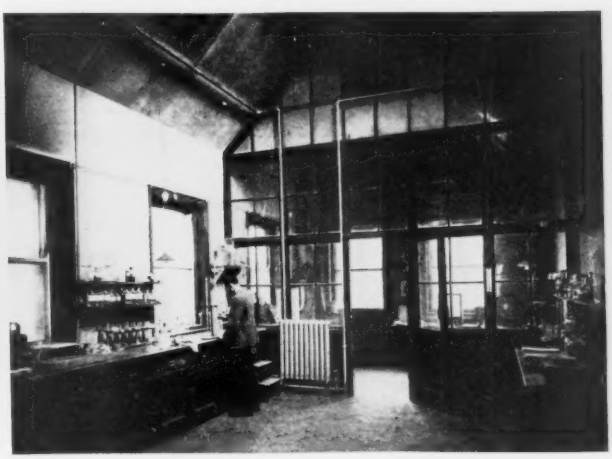


View of the packing platform. The company uses packing machines said to be unique in the British cement industry

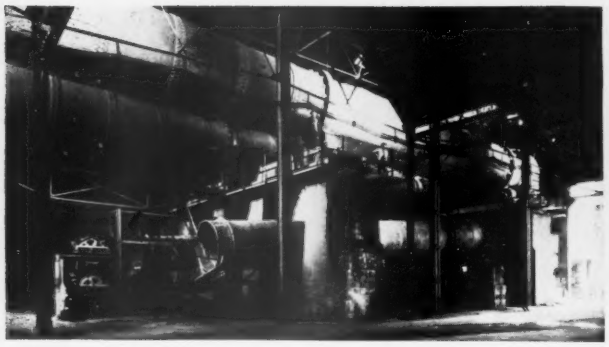


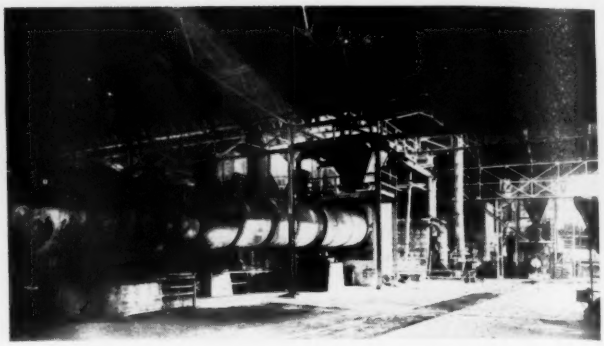
Top floor of the kiln house looking along one of the kilns. The length of this kiln is 200 ft.

Wharf on the Manchester ship canal side of works. It is said to hold all records for dispatch in loading and discharging cargoes



The laboratory not only controls the manufacturing work but makes tests for customers of both cement and aggregates





Left, the cooler underneath the kiln and connection to bucket conveyor. Right, end of kiln showing dust collector and a part of the grinding plant in the background

Before leaving the quarry the stone required for the manufacture of cement is broken to 1¼ in. and down and for "Carbo-Limo" to approximately 6-in. pieces. The larger stone after discharge is conveyed under the wharf and elevated to the crushing department adjacent to the wharf and is broken by means of a jaw crusher to 3 in. and then passed through Jeffrey mills to be pulverized to 1¼ in. and down ready for the factory.

From this limestone the company prepares and markets a commodity in the form of an extremely fine powder under the trade name of "Carbo-Limo" for all agricultural and many other purposes.

The company can, with its present installation, produce 6000 tons of "Carbo-Limo" per week in addition to its cement output.

It is interesting to know that from its Little Ormie limestone quarries, in addition to shipping limestone—one of the raw materials for the manufacture of its cement—to its works it also supplies this limestone for blast furnace and chemical uses. This is due to the remarkable purity of the material, which is, speaking commercially, pure carbonate of lime.

Most of the work done here is, as is the case throughout the whole of the works, chiefly mechanical. The stone, when required in the factory, is extracted from the bins through shoots in tunnels beneath the bins, the gravity system adopted being ingenious but simple and effective. Through the shoots the stone runs into cube-yard wagons and is drawn by a 2-ft. gage locomotive to the factory.

Special railway trucks are employed to bring the shale from the quarry and the cement company's special train is known locally as the "Ellesmere Port Express." The 15-ton wagons are hoppered and provided with bottom doors, mechanically operated, and, as each truck is in turn halted over an underground hopper, the bottom doors are released and the mass of shale falls by gravity into a bucket elevator.

The shale, on being discharged from the wagons, is elevated and carried on belt conveyors to three huge reinforced concrete silos. There are in all seven of these silos, the other four being reserved for the limestone. From these storage silos are drawn the limestone and the shale in the required proportions (determined by measurement), and the resultant mixture of stone is carried by a belt conveyor to the elevator, by means of which it is again raised and passed into steel bins from which the grinding mills are supplied.

The stone is fed to ball mills and water is added. These ball mills are steel-lined cylinders loaded with steel balls of varying sizes, which as the mills revolve, cascade and grind the stone. When the product, which is now a fluid, leaves the mills it is conveyed by elevators to trix machines.

These machines separate the product, the fine material passing from the distributors to be fed to the tube mills, the coarse particles being returned to the ball mills for further grinding. The tube mills are cylinders lined with stone and loaded with flint pebbles. As the mills revolve the pebbles cascade, performing the grinding duty on the raw material passing through.

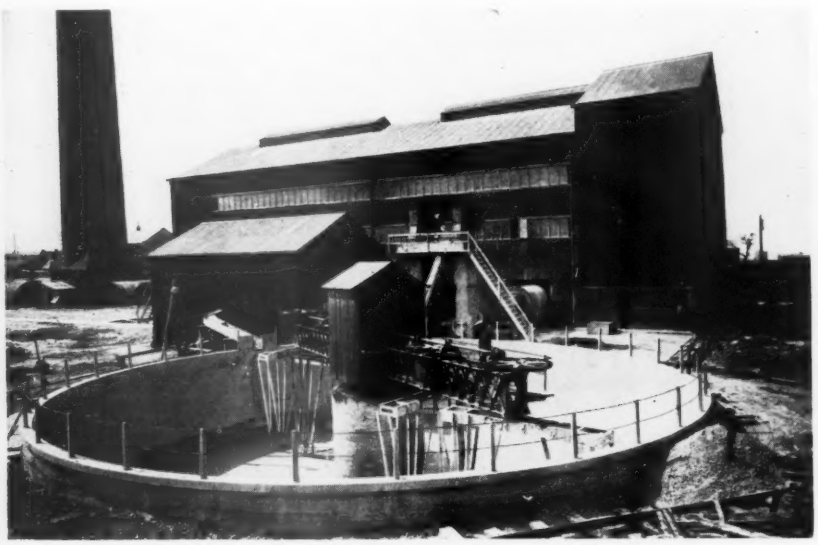
An Ingenious Mixer

When this material finally leaves these tube mills it is known as "slurry"—of course in liquid form—and is carried by means of troughs to the slurry tanks. These are circular tanks constructed of reinforced concrete, 66 ft. diameter by 13 ft. deep. A most ingenious mixing plant, fixed on a center base, keeps the mixture in motion.

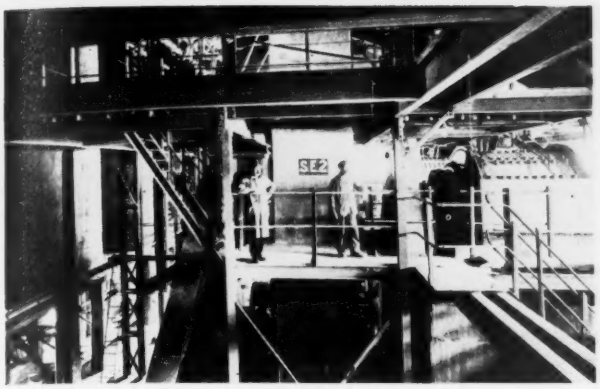
This is known as the "Sun and Planet Mixer," the revolving arms of the apparatus being carried across the tank, while at the same time the whole contrivance moves slowly around the tank. Thus every part of the mixture in the tank comes within the scope of the revolving arms in turn, and the tendency to settle is arrested.

The slurry is then raised as required, by means of three-throw slurry pumps, to a pipe line feeding other slurry tanks at the base of the rotary kilns, from which it is pumped up to and passed into the kilns. The quantity passing into the kilns can be regulated, separately for each kiln, according to requirements, the whole being regulated on the firing platform—referred to later—by the operator in charge of the kilns.

There is much that is intensely interesting in a cement factory, but perhaps the working at the kilns is the most fascinating part



This looks like a big Dorr thickener, but it is a "sun and planet mixer," so-called from the way the stirring arms rotate. It is a British device not used in this country



A section of the raw material grinding plant with a ball mill on the right-hand side

of the whole process. Here are the two huge steam (not smoke) stacks, 200 ft. high, built of reinforced concrete, and three steel stacks of smaller dimensions, visible for miles around, with huge quantities of steam issuing from them day and night throughout the year. Attached to these stacks are the five rotary kilns, being huge horizontal cylinders, three each 130 ft. long by 8 ft. in diameter and two 200 ft. long by 9 ft. in diameter and 10 ft. in the burning zone. These cylinders are lined with special firebrick, are mounted on rollers and slowly rotate at varying speeds as required. They are motor driven with suitable gearing and are inclined towards the firing end—the burning zone as it is called.

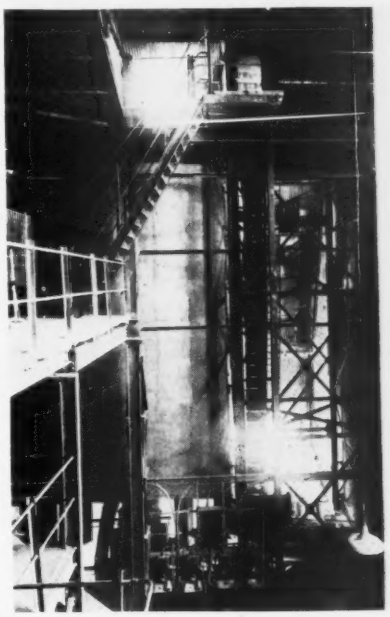
[It would appear from the two sizes of kilns that the plant is or has been run as a combination wet and dry process plant, although this is not stated in the original article.—Ed.]

The slurry is pumped (as already described) from the tanks below and falls in measured quantities at a regulated speed into the raised ends of the rotary kilns, down which it travels by gravity, meeting the heat from the burning zone, where there is a constant temperature of approximately 3000 deg. Fahr. By this means the water is driven off and pases up the stacks. The dried and partly calcined material passes on to the burning zone, in which the calcination of the material is completed, and through it into other revolving cylinders below known as coolers. These, inclined also but running back for an extent of about 70 ft., carry the calcined material, now known as "cement clinker" to a gravity bucket conveyor which carries the clinker directly to the belt conveyor which feeds the hoppers over the clinker pulverizing mills or alternatively to the clinker store.

All clinker not immediately required for grinding is conveyed to a clinker store of 7000 tons capacity. The surplus clinker is deposited at any point down the center of this store by a simple device for tipping each bucket of the conveyor as it passes. The conveyor also recovers the clinker from the store as required by the grinding department.

It is interesting to note how the coal used is prepared for combustion in the kilns. The coal used for calcining is of a special quality and is first dried by passing through revolving dryers and then passes to high speed pulverizing mills, where it is reduced to a very fine powder. The pulverized fuel is conveyed and elevated to feed hoppers situated at the firing end of the kilns, each kiln having its own hopper, and then conveyed through a pipe by means of an air blast into the kilns, where the volume of pulverized fuel immediately ignites in the burning zone. The pulverized coal hoppers and the coal feed apparatus are situated on what is known as the firing platform, where the operator in charge of the kilns—known as the burner—has complete control of all the kilns operations by means of the ingenious system of electrical control gear installed on this platform.

The mills consist of batteries of ball and tube mills and Fuller and Griffin mills of the high-speed type. Here the clinker is



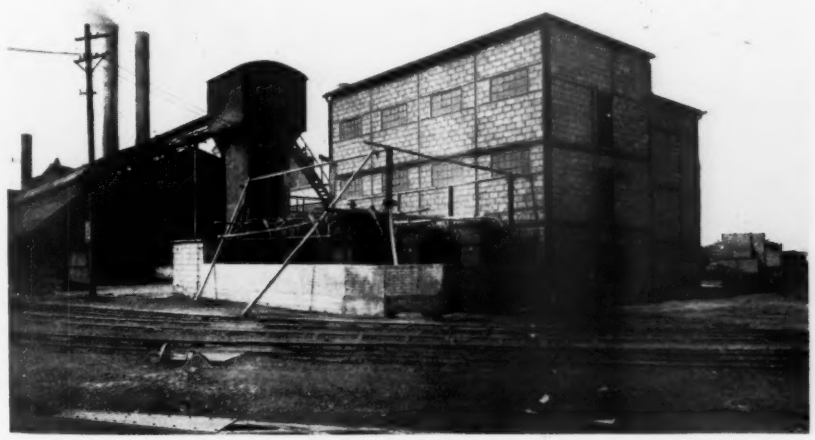
Interior view of elevator house

ground to the required fineness and the finished cement is conveyed to the cement store.

The storage consists of huge reinforced concrete bins with a capacity of upwards of 15,000 tons, and here the cement is retained until required for dispatch to customers. The system of depositing and recovering the cement is by conveyors of the steel worm type and elevators. This store adjoins and runs the full length of the packing department.

Pack in Bags and Casks

The packing department is a model of ingenuity and convenience. On one side are the packing machines which are separated from a railway siding by a working platform of concrete. The cement is drawn from the storage bins by extracting worms and carried by conveyors and elevators to the machines in the packing department. The machines in this department are unique for the cement industry.



End of gravity bucket conveyor which connects these kilns with clinker storage and the transformer house behind

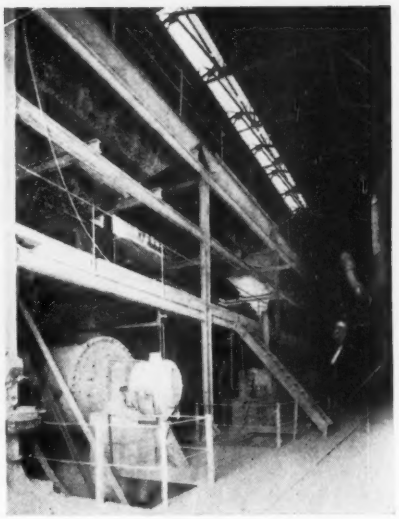
Certain of them are equally suitable for packing into sacks or bags or into casks as required. These work in pairs. Others again contain spouts for filling bags alone, four at a time, and by the ingenious method adopted they are filled and weighed after the mouth of the bag has been tied and are immediately ready for conveyance. The sacks on the other machines have to be tied and the casks "headed up."

The filled sacks and casks are trucked across the platform to the waiting wagons, for conveyance inland by rail, or to the wharf for shipment to other ports in the British Isles or abroad. Wagons (freight cars) of various railway companies, or the cement company's own wagons, are used according to destination. Excellent arrangements are provided for loading large quantities by motor vehicles. The company runs a number of its own vehicles and delivers the cement direct to the job.

The company packs its casks by a unique method with special machines by which it definitely insures the casks reaching their overseas destinations, ofttimes involving innumerable handlings, with their contents intact, both as to quantity and quality. The company has at its works a cask of "England" brand portland cement that has traveled practically around the world, covering a period of over 15 months. Notwithstanding having passed through varying climatic conditions, and in the order of things having received more or less rough usage, nevertheless, both the package and contents are in perfect condition.

The extra cost incurred by this company in the making and packing of its casks is saved by the customers many times over through the casks reaching their destination without the loss—in many cases very heavy—which is sustained when cement is packed in cheaper and consequently inferior casks, to say nothing of the nuisance and extra expense incurred in every handling the cask receives until it reaches its destination.

The works have a cooperage fully equipped with the most modern cask-making machinery of great producing capacity to deal promptly with orders, installed in an extensive building, in which the whole process of cask making is carried through with remarkable celerity and efficiency. On the works estate are thousands of tons of stavewood stacked awaiting the call of the coopers.



Discharge end of clinker pulverizing mills

The stavewood, when wanted, is taken to the cooperage, shaped at the ends for casks, tongued, grooved, heated, hooped, etc., until having gone from end to end of the building and passed through a score or more different hands it finally emerges the finished cask, only awaiting the cement, the head and the labels to be ready for its journey to some far-off clime.

Any size and kind of cask can be supplied according to customers' requirements.

Good Dust Collecting System

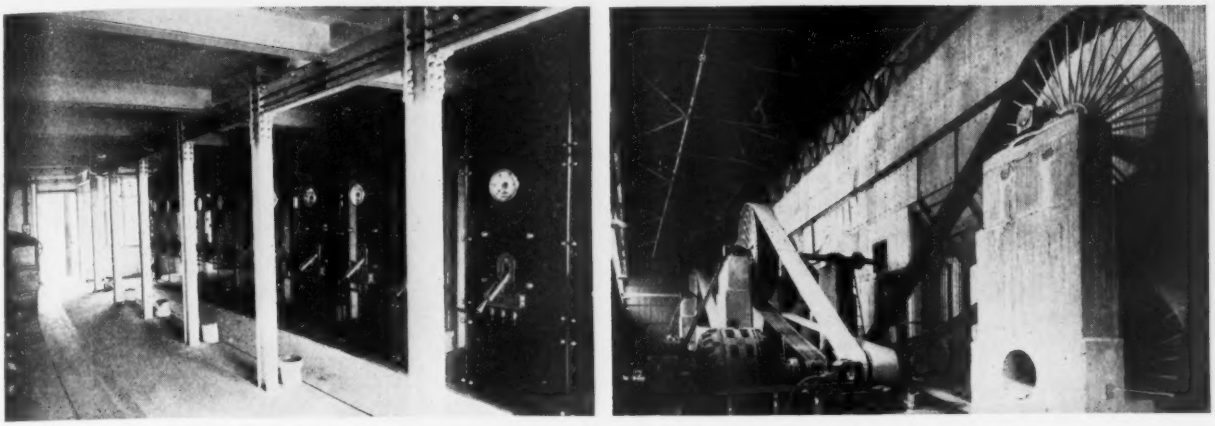
One would naturally expect a large amount of dirt and dust when visiting a cement works but at these works there is such a fine system of dust collectors installed at considerable expense in all grinding departments that the absence of dust is particularly noticeable. The principle of these dust collectors is to draw the dust and steam from the delivery end of each mill and dryer. The steam and dust thus drawn into the machines is separated in special flannel bags in a series of chambers, the dust being retained and the moisture passing to atmosphere. That the trouble and expense in installing these advanced methods have been justified is seen by the remarkably healthy appearance of the workers.

There yet remains the laboratory of the works to be mentioned, the work of which is of supreme importance for the maintenance of the production of cement of the highest quality. From the loading of limestone at the wharf or of the shale at the factory to the time the finished cement is loaded into trucks for dispatch, the chemist is very much in evidence.

The properties of the limestone and the shale have to be tested, the mixture of the two proportioned so as to insure uniformity in the resultant slurry followed by constant tests being made of the slurry up to the point of being fed to the kilns, and this work proceeds at stated intervals night and day. In fact the testing work proceeds constantly without intermission from the time the raw materials are received on the works until the finished product is dispatched. The remarkable feature is that owing to the uniformity of the chemical analysis of the raw materials and the excellent proportioning arrangements, the company has never found it necessary to put into operation the doctor (i.e., regulating) plant installed at considerable expense in connection with the raw material grinding department. Incidentally, it may be mentioned that the laboratory is placed at the service of the company's customers to investigate the character of their aggregates and give advice generally.

The works machinery is electrically driven throughout. The development of the company's undertaking has hitherto been retarded by the insufficiency of the supply of power produced from its own power plant. To overcome the inadequacy of the power supply and to serve the

The cooperage shop. The tongueing and grooving and other machines are at the left



Left, view of switchboard in transformer house. Right, drives for the clinker pulverizing department with 350-hp. 3000-volt motors

whole of its power requirements, including that required for the plant just completed, the company some time ago contracted with the Mersey Power Co. for a bulk power supply from that company's Weston Point power station, where it has practically unlimited reserves. This supply—the installation of which has been greatly delayed—was connected up to the works at the beginning of this year.

Electrical Details

This current is delivered at 33,000 volts pressure through a duplicate set of mains laid along the bank of the Ship Canal to the power station on the cement works estate. This current is passed through transformers and delivered to the cement company's equipment at 3000 volts for the 350-hp. alternating current 3-phase motors driving the ball and tube mills in the wet and clinker grinding departments, and at 440 volts alternating current 3-phase for the other motors.

The voltage for lighting and sundry motors driving accessories being 250-volt direct current, a 440-volt connection is passed through the cement company's own sub-station and is reduced by rotary converters to 250 volts direct current as required. The cement company delivers the current to the various departments through cables hung on brackets in covered concrete trenches, in which are also laid water slurry and other service pipes, and the whole installation being very accessible.

The company has installed excellent switchboards and electrical gear as an ample and reliable power supply is the life's blood of any cement factory and the ideal condition is to continuously operate all the year around without cessation.

The works is also provided with up-to-date mechanics', electrical, joiners', etc., shops to effect speedy repair and constructional work.

The welfare and social side of the works is well worthy of note. There is a modern and fully equipped ambulance room under the supervision of the welfare superintendent, where all accidents—of which there are, happily, very few—are immediately treated. The workers are regularly visited, everything possible being done to keep the health of the employes and their families up to the highest standard. The social and sports clubs, of which there are several, are run entirely by the employes. These clubs were started in the first instance by the company, but are now self-supporting. In the long winter evenings whist drives, dances, and smokers are organized. The football teams run by the works are among the first in Cheshire and they have secured many cups. They are supported entirely by voluntary contributions from the employes, augmented by gate receipts. The football ground is on the company's estate and provides grandstand and other accommodation for several thousand spectators. In the summer cricket, tennis, and bowls hold sway and in matches with other clubs the works' teams are extremely successful.

Thus it will be realized that in the combination of work and play the company and its employes pull together with a spirit of happy co-operation.

The success of this enterprise is due to the efforts of G. A. Watson, who was the originator of the enterprise and who is now chairman and managing director of the company.

American Concrete Building Stands Japanese Earthquake

AN American built reinforced concrete building stood like a monument in Yokohama during the earthquake while buildings all around it fell in heaps of debris, it was related by A. D. Milmine, representative in Japan for Marshall Field & Co. Mr. Milmine has just arrived from the devastated region. He escaped from his Yokahama office just before an eight-story building crashed down upon it, says a news dispatch.

A reinforced concrete building, six stories high, with a tower at either end, had just been completed for the telephone company by an American firm, Mr. Milmine said. "On one side of it was the Deutsche Asiatische Bank building, a massive stone structure of four stories. The Charter Bank, similarly built, was on the other side.

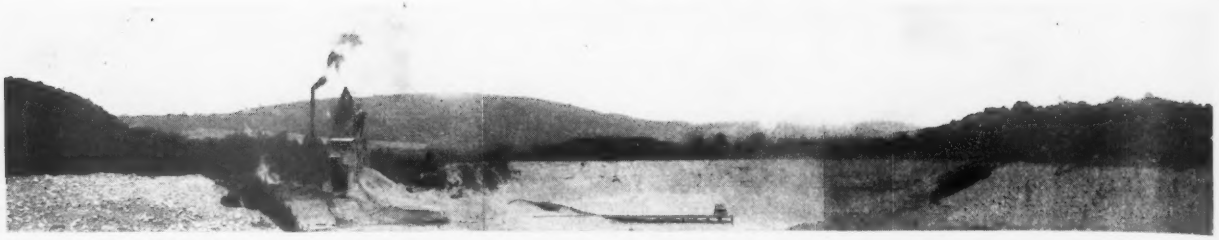
"The furious shocks of the quake were like a gigantic piston striking the earth's crust from underneath, driving it three feet in the air and letting it fall back again. They shook these two massive buildings to mounds of stones. But between them the concrete building stood up like the rock of Gibraltar and seemed practically uninjured."

Cement Association Engineer Will Investigate Earthquake Effects

HOMER M. HADLEY, district engineer in charge of the Portland Cement Association office at Seattle, sailed for Japan October 5 to make a thorough investigation of how modern structures, particularly those consisting largely of reinforced concrete, withstood the recent earthquake.

Mr. Hadley is particularly well qualified for a mission of this kind, having for many years specialized in structural engineering. Before joining the forces of the Portland Cement Association, his practical experience included a number of years with some of the foremost engineering firms on the Pacific coast. Shortly before coming to the Portland Cement Association, Mr. Hadley was structural engineer for the Seattle school district.

Mr. Hadley's trip will probably require three months or more absence from his official duties with the Portland Cement Association, although it is expected that very soon after his arrival in Japan he will be able to cable a condensed preliminary report that will reconcile a number of conflicting messages which have been sent out, leaving us thus far mostly in doubt as to just how modern structures in Japan withstood the earthquake.



The gravel plant and deposit of Warren Sand and Gravel Co., near Carpenterville, N. J.

Concrete Brick and the Gravel Plant

Warren Sand and Gravel Co., Easton, Pa., Operates a Successful Concrete Brick Plant in Conjunction With the Sand and Gravel Business—Brick Manufacture Affords Considerable Outlet for Sand

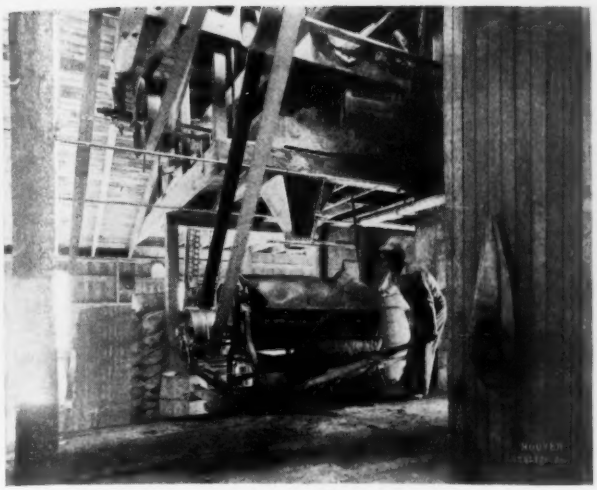
THE manufacture of concrete brick in the larger sand and gravel plants is becoming more and more common throughout the country. This is due largely to two reasons. First, that concrete brick, if made properly, can compete successfully with clay or any other kind of brick; in strength, color, and texture concrete brick, properly made, is no longer a doubtful quantity. Secondly, the unusual activity in building operations during the last few years brought about a shortage of brick and the larger sand and gravel plants saw in this condition an opportunity to sell sand by the pound instead of by the ton—an opportunity that would afford a considerable outlet for sand, which in many localities is a waste product, and at the same time have a side line that would pay good dividends.

Of course, there have been failures in the concrete brick business, but these have been largely due to poorly made brick and lack of real sales effort. This is particularly true in the smaller plants. Few of these plants have attractive offices. Usually the plant building and office are represented by a ramshackle structure of wood and certainly a prospective customer is not favorably impressed by a visit to such an operation.

Few concrete-brick plants have collections of photographs of buildings built with their brick or structures in which their product was used. Very few are qualified to tell prospective customers how to use their product to the best advantage and it is generally conceded that no matter how good a product may be *a service* must be sold with it before it can be successfully introduced. Such a thing as advertising concrete brick in newspapers and local building journals is practically unheard of. Is it any wonder that there have been so many failures in the concrete brick business?

Selling concrete brick is fundamentally the same as selling any other commodity.

The building where Shope concrete brick is manufactured. Loading track is on side not shown in photograph



Platform where batch mix is prepared for brick. Sand hopper is overhead the mixer. Cement is delivered from main loading track by chain elevator

Brick machine where both Shope common and face brick is made. The close-up shows operator striking off surplus material

The plant that knows it turns out a high grade product, and has proper data to prove it, has only to tell the good points to sell the brick. It should have an attractive office where a prospective customer may be invited to see panels of brick laid up in different combinations. And last, but not least, a knowledge of the building game. A wide-awake and enterprising producer can make a good success of the concrete brick business, even as an adjunct to his sand and gravel business. Properly conducted, it may even outgrow its parent.

The Warren Sand and Gravel Co., of Easton, Pa., with plant near Carpentersville, N. J., on the Delaware river, operates a successful concrete-brick plant under the Shope process. The brick plant is not ostentatious but it is well laid out, neat, and the men behind it have a thorough knowledge of what they are doing. The main office is located at Easton, Pa., and here prospective customers are invited to see the different panels of Shope brick. The company has photographs of buildings and structures in which its product was used. And, from time to time, it has indulged in good publicity work.

Approach to trestle. This 2-cu. yd. bucket delivers material to hopper located 90 ft. above ground level

The concrete brick plant of the Warren Sand and Gravel Co. adjoins their gravel plant and the building is 42x160 ft. over all. The sand is brought to the plant in gondola cars and is shoveled direct into a small chain elevator which discharges the material to a sand hopper of 45 tons capacity. Sacked cement is brought in on the same loading track, put on a small chain elevator and deposited on the platform overhead a 9 cu. ft. Blystone mixer.

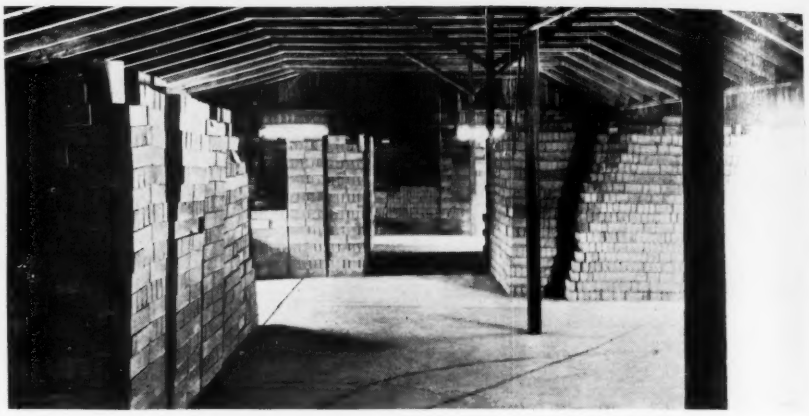
As the batch is prepared it is wheeled by hand and deposited in batch boxes alongside of the brick presses. The company has four brick machines and one tile machine, with ample facilities for doubling the unit. The brick are tamped in the usual way, put on pallets, and hauled away by a Shope pneumatic tired carrier to the kilns and curing

In the foreground, delivering mix to presses by wheelbarrow. Pneumatic tired off bearing truck delivering empty pallets to operators

One of the three 8x50-ft. kilns or curing rooms. The brick are cured by steam delivered in a perforated pipe lying in a water trough

rooms, of which there are three, each 8x50 ft. The kilns hold approximately 10,000 brick. After curing, the brick are hauled to inside storage, which has a capacity of 120,000 brick.

From the accompanying photographs can be judged the simplicity of the plant. The main market for the concrete brick made by the Warren company is in Easton, which is an eight-mile haul from the plant. However, the company also sells in Bethlehem and Allentown, Pa., two very important industrial towns.



The inside storage holds 120,000 brick. The loading track is on the left side

The Gravel Plant

The gravel business of the Warren Sand and Gravel Co. was started in 1910. A small plant was built which had a 75-ton per day capacity. At that time wheelbarrows and shovels were used. The business gradually grew until the present plant was established with a 600-ton capacity per 8-hr. day.

The deposit which the company operates is a remarkable one. It is 72 acres in extent, of which 42 contains 55 per cent gravel, 45 per cent sand to a depth of 60 ft. The remaining 30 acres contain 75 per cent sand and 25 per cent gravel. The property also contains a 2000-ft. face of good limestone, but this has never been developed. The entire company's property is 201 acres in extent.

The screening, washing, and loading plant has a capacity of 600 tons per 8-hr. day

The dragline cableway excavator in operation. It reclaims all the material near the trestle

When the present plant was built the material was excavated by a slack-line excavator system with a 2-cu. yd. bucket. It had a span of 600 ft. and in time took out all Situated as it is along the Delaware river, with a mill frontage in a beautifully scenic country, it derives some revenue by renting out cottages to vacationists for the summer. industrial haulage system. The shovel, a ¾-yd. Marion caterpillar, loads sand into 4-cu. yd. rocker dump cars which are hauled by a 15-ton Vulcan locomotive to the trestle and there the contents are dumped. From here the dragline cableway picks up the material and discharges to main hopper in the screening plant. The company has found this system well suited to their style of operation.

The screening and loading plant contains no unusual features. A four-deck shaking screen is used for separating the different sizes, the material being washed as it is screened. Two jaw crushers (both Acme), one 10x20 in. and one 13x26 in., are used for reducing oversize gravel. The plant has five bins, two sand bins of 125 tons capacity each, a bin holding ½ in. material of 80 tons capacity, one with ¾-in. material of 125 tons capacity and one with 1½ in. material of 175 tons capacity. Cars are loaded underneath the bins and there is ample storage for 18 cars on the track.

The president of the Warren Sand and Gravel Co. is W. J. Kressler; vice-president, W. A. Stotz; secretary-treasurer, Kenneth F. Kressler, and general manager, Herman D. Wolf.

Steam shovel loading sand into 4-cu. yd. rocker dump car. This is hauled to trestle and dumped. It is reclaimed by the dragline cableway excavator

Plant of the Tacoma and Roche Harbor Lime Co., Roche Harbor, Wash., before the fire in August, 1923

Rebuilding the Roche Harbor Lime Plant

Battery of Kilns Will Soon Be Housed and Hydrating Unit Will Be Added to New and Improved Plant

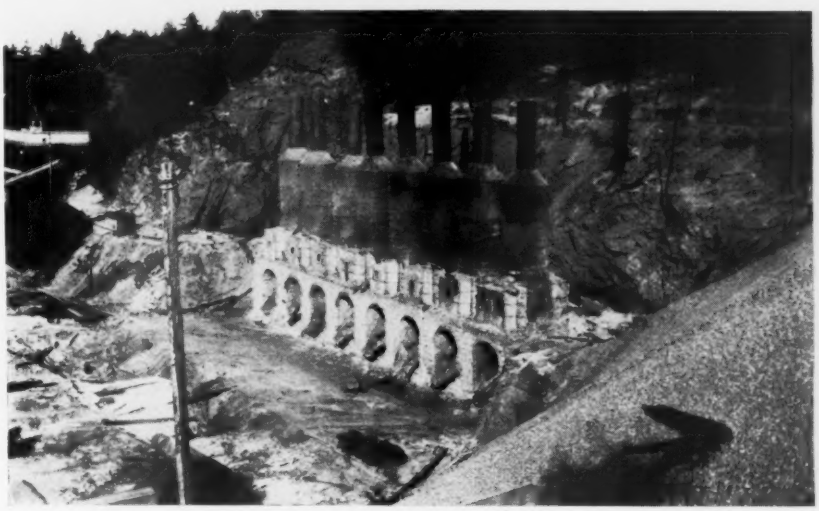
THE editor's recent trip to the West Coast and a recent visit of John S. McMillan, president of the Tacoma and Roche Harbor Lime Co., to Chicago, gives us an opportunity to supply the lime industry with some interesting facts about this operation.

As readers may recall, this is one of the most notable and progressive lime operations on the coast. The original plant, shown at the top of this article, was destroyed by fire in August, as noted in ROCK PRODUCTS, August 11, 1923. Mr. McMillan immediately set about rebuilding the plant, and it will soon be in complete operation again, together with a new hydrating plant. Incidentally, his experience is an example of good business. As is the case with nearly all lime plants it was impossible for him to carry insurance that would represent an actual replacement value, but having kept costs in a business-like way for many years, accumulated depreciation on the plant took care of a large part of the difference between insurance and the replacement cost. The lime manufacturer who is not honest with himself in the matter of depreciation, sometimes counts the amount thus charged off as camouflaged profit.

Mr. McMillan is not only a good business man but a thorough student of lime manufacture. He has made his stone, his fuel and his kilns the subjects of years of research and experimenting until he has determined to a dot just what cross-section his kilns should have, their height, the construction of the fire boxes, and every other detail. And in these investigations he has determined results in relation to *quality* as well as *quantity* of lime produced. We shall have more about Mr. McMillan's kilns.

The lowest of the three views is of particular interest in illustrating the remarkable fire-resisting qualities of limestone masonry. This ought to prove helpful to limestone quarrymen who have difficulty overcoming prejudice to the use of limestone concrete aggregate in city building work.

Original plant showing how fir-wood fuel is brought in barges and the barges unloaded into the conveyor on the side hill



Plant after the fire, showing remarkable fire resistance of limestone masonry in the kiln foundations

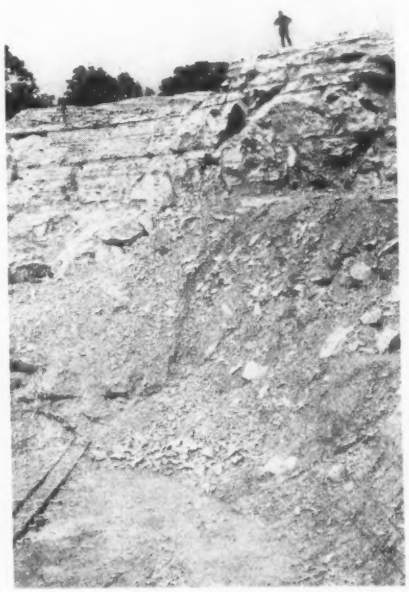
Producing Agricultural Lime and Whiting from Arkansas Chalk

Krippendorf-Tuttle White Cliffs Products Co., White Cliffs, Ark., Developing 900-Acre Tract and Marketing the Product as Agricultural Lime, Asphalt Filler and Whiting

By George M. Earnshaw

IN the extreme southwest corner of the state of Arkansas, about 23 miles from Texarkana, is located the tiny village of White Cliffs, and within this little village are the plant and operations of The Krippendorf-Tuttle White Cliffs Products Co. This company, under the direct supervision of its vice-president, Col. Simon Ross, is developing a 900-acre deposit of chalk and has built a plant, for reducing the material to the various sizes required, which is of unusual design in many respects owing to the nature of the raw material.

The Krippendorf company's attempt is the third one made to develop the property. The first attempt was made early in the nineteenth century by Dutch capitalists, who built a large plant for the manufacture of portland cement. The operation is said to have been fairly successful and a considerable amount of cement was manufactured and used in construction work all over the country. The present owners claim that this cement was used in building the state capitol at Little Rock, as well as that city's largest concrete bridge. This company, however, soon collapsed because of the antiquated machinery installed which kept its production costs too high.

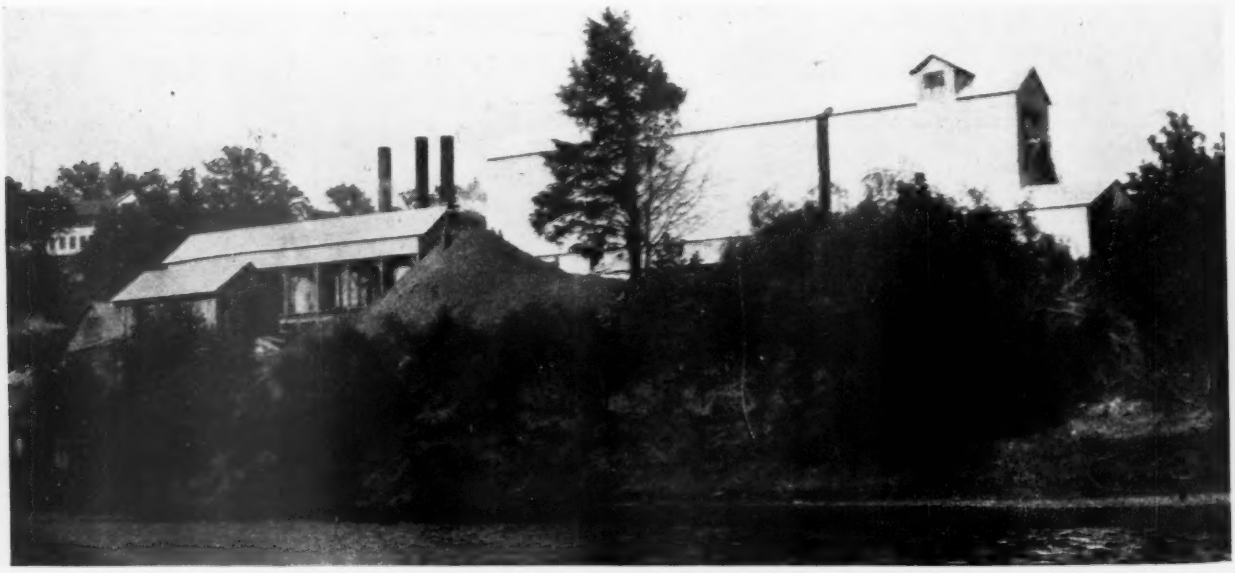


Quarry No. 2, showing the top and center strata. The man on top of the face is Colonel Ross, vice-president

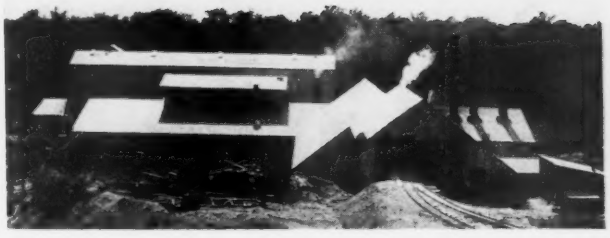
The second attempt at operation was unsuccessful because of the operators' lack of funds which restricted them from building a plant of sufficient capacity to produce fertilizer in the amount necessary to pay returns on the entire property. The attempt proved, nevertheless, that the product was excellent for fertilizer purposes.

In all, the property consists of 2600 acres, 900 of which are covered with chalk in three strata above water level. The average depth of the deposit is 400 ft., 150 ft. of which is above water level. A conservative estimate, officials claim, shows that the property contains more than 400,000,000 tons, which, at the rate of 2000 tons per day, would require more than 700 years to excavate and prepare for use.

The deposit is free from any evidence of earth movement, the strata apparently lying as they were sedimented thousands of years ago in the bed of the ocean. It is said that the Gulf of Mexico originally had its shore line a few miles north of the deposit and the large amount of small marine organisms then living in it are responsible for the present chalk deposit. It is the theory of those who have studied the deposit that at one time it was many miles out from the shore



General view of plant as seen from the company's motor boat in Little river. At the extreme left and in the background are the club and office



At the left is quarry No. 2. Note the searchlights for night work; right, the plant as viewed from quarry. The cars go directly into the plant and are side dumped into the primary crusher

line, as the absence of sand or grit indicates that the minute shells were deposited in an environment of soft clay or mud. The high cliffs indicate that the deposit probably faulted after the water receded and that a portion has been washed away by the stream now passing through, leaving the remainder of the chalk in the condition in which it was originally deposited.

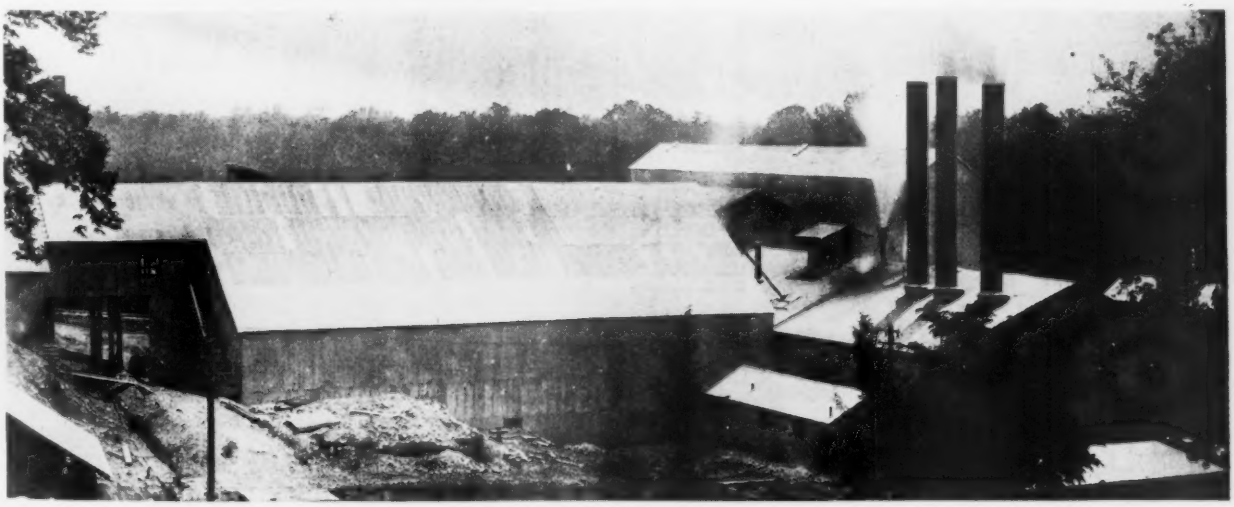
The top stratum contains the finest material of the three, as it is a light cream and 100 per cent free from grit and other foreign matter. It is used exclusively for manufacturing whiting and has been approved by some of the largest rubber-goods manufacturers in the United States. The second, or center, stratum is of a grayish color and is somewhat harder than that of the upper layer. It is used, in its manufactured form, almost exclusively as an asphalt filler. The lower stratum, to the present water level, is light blue in color and is considerably harder than its overburden. This is ground and sold for agricultural purposes, although the company has marketed a considerable amount of it as a road base, size, dust to 1½-in. The material is fairly soft and when crushed averages in weight 57 lb. per cubic foot.

The company's biggest business is in whiting, the uses of which are greatly diversified. This product is used as a pigment in the manufacture of paints, fabrics, paper, cosmetics, glazed chinaware and rubber articles. Heretofore, England has had this business all to herself, supplying the material from the famous chalk cliffs of Dover. In 1919 England exported to America more than $40,000,000 worth of chalk which was used for the above mentioned purposes. The Krippendorf company's deposit is the only one of its kind yet discovered in the United States, and as a result of tests and examinations made by chemists of national reputation, the Arkansas chalk has been declared as pure, if not purer, than that found in England, and at least its equal in physical characteristics.

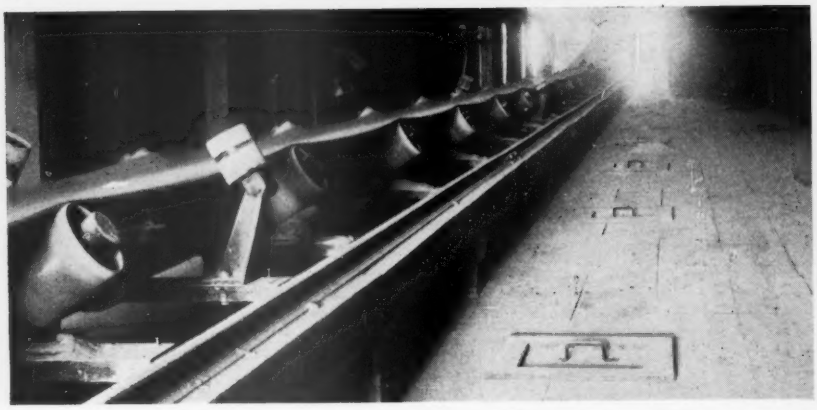
A portion of quarry No. 2. At the extreme right may be seen the tip end of the steam shovel's boom

The quarry is in excellent condition and is divided into two operations, designated locally, as quarries Nos. 1 and 2. Drilling is done by Model D-24 Ingersoll-Rand drills, while loading is done in one quarry by a No. 18 Osgood steam shovel and in the other by hand. Western cars, which are of 1½-yd. capacity, two-way dump, 36-in. gage, are moved by gravity to the plant and are returned to the shovel by a 3½-ton Plymouth gasoline locomotive.

The plant buildings are of timber construction, the timber being obtained on the company's property and sawed in its own sawmill. More than 1,000,000 ft. of hard-



View of the plant from the porch of the office. It is covered entirely with corrugated steel

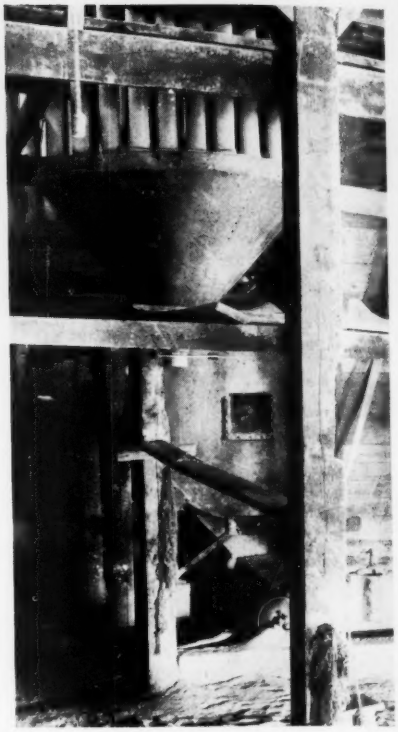


This 18-in. shuttle conveyor handles the finished product and empties it into any one of six bins, according to grade

wood timber were used in the plant's construction and the company keeps a stock pile of 1500 cords on hand at all times for fuel.

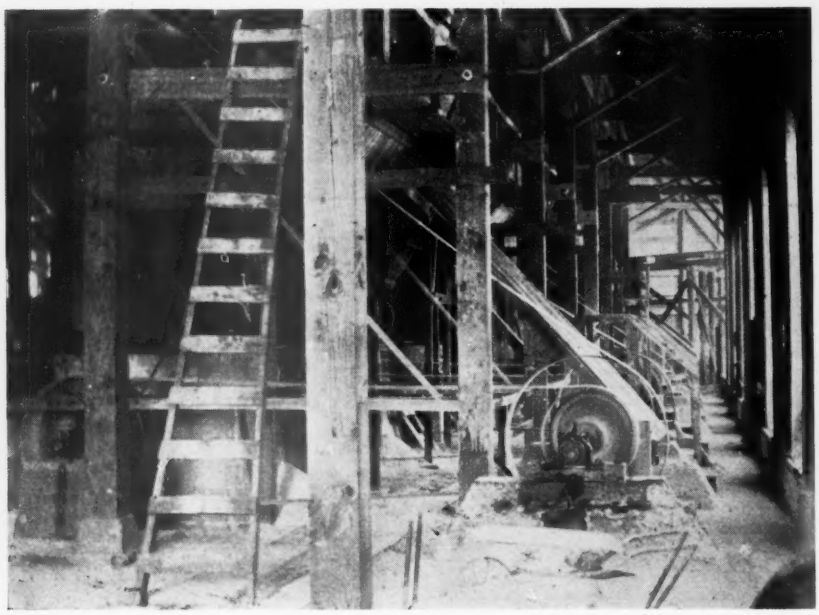
The main breaker in the plant proper is a No. 6 "Mammoth" Williams crusher with a 48x48-in. opening, which takes the material from the quarries in sizes as large as 36 in. It is fed by a 4-ft. steel feeder of 20-ft. centers, which affords a consistent and uniform feed. The crusher is set to discharge at 1½ in., and its product is received by an 18-in. conveyor of 150-ft. centers, which is equipped with a shuttle for depositing the material in the various storage bins. This conveyor, as well as all other conveying and elevating equipment throughout the plant, was furnished by the Webster Mfg. Co., Chicago. There are 27 bins, having a combined capacity of approximately 8000 tons. The building housing these bins is likewise of heavy timber construction and has a covering of corrugated steel. The company is now building two additional storage units so that upon their completion there will be storage accommodations for more than 25,000 tons. A preliminary direct-heat dryer, 7 ft. in diameter by 80 ft. long, is to be installed and will be located between the preliminary crusher and the raw material bins. The company plans also to build a 20x80-ft. two-story warehouse at the south end of the plant. The lower floor will be utilized as a stock room for sacked material and the upper floor will be used as a sack serving and storing room.

Running underneath the bins is a second 18-in. conveyor of 132-ft. centers. This belt empties into the boot of an 8-in. by 42-ft. enclosed chain-bucket elevator which discharges into a 7-ft. 6-in. by 55-ft. semi-direct heat rotary dryer, manufactured by the L. R. Christie Dryer Co., Pittsburgh. This dryer has a capacity of 30 tons an hour. A smaller one, manufactured by the Gruendler Patent Crusher and Pulverizer Co., St. Louis, serves as an auxiliary unit.

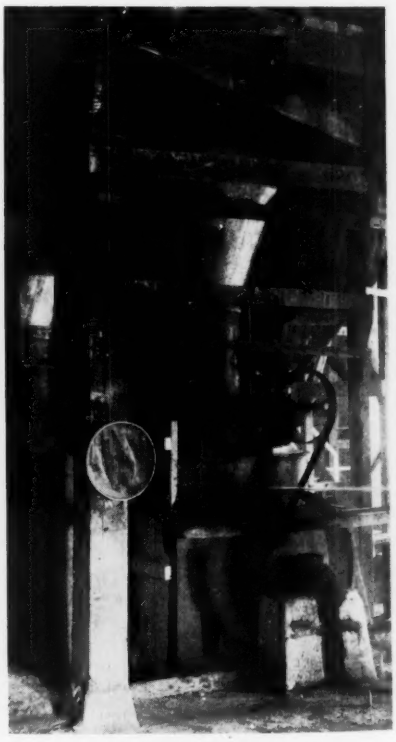


This shows the discharge end of the 6x56-ft. dryer; Raymond dust collector above

From the dryers the material is handled by enclosed chain-bucket elevators which



Interior of the grinding plant showing system of drives



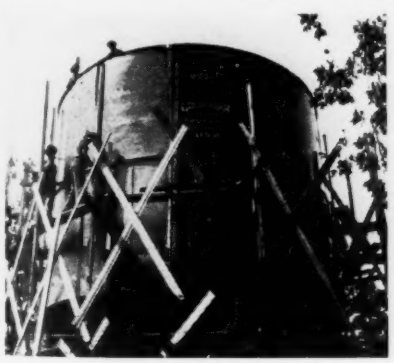
One of the three grinding mills. It is driven from the main line shaft

More than 300 steps lead to the office from the plant, but the restfulness of the place is worth the climb; right, view of cliffs in their natural state as seen from boat in Little River

take it to the hoppers of three Raymond four-roller mills, where it is ground to a fineness of from 95 to 98 per cent through a 325-mesh screen. From these machines the finished product is moved by conveyor to two of six five-car storage bins, there being two bins each for whiting and asphalt filler and one for agricultural lime. These bins are of special construction, being lined with waterproof paper and close tongue-and-groove timber so that they are moisture-proof and practically air-tight. At the extreme end of this row of bins is the bag and packing house which is equipped with two Bates valve-bag packers and two Howe sackers, the latter for handling open-mouth sack requirements.

Material to be ground for agricultural use is moved from the first storage bins by belt conveyor to a No. 4 Williams "Jumbo" crusher which is driven from either the main line-shaft or a 75-hp. motor, so that it may be operated independently of the rest of the plant in case of an emergency. This crusher reduces the lime from 1¼ in. to ⅛ in. to dust, and the finished product is likewise moved to the final storage by belt conveyor.

The operating staff. Left to right, Colonel Simon Ross, vice-president; Herman Wanke, superintendent; Henry Beckman, construction foreman, and Lem Matthews, mill superintendent



This 50,000-gal. tank assures a protection against fire for the plant as well as all the dwellings

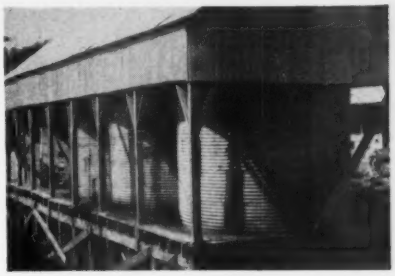
The power plant's chief unit is an 18x36 Corliss engine, manufactured by the Allis-Chalmers Mfg. Co., developing 350 hp. This engine is steam powered by three Heine water-tube boilers with oil burners, having a total of 750 hp. It is direct connected to a Crocker Wheeler generator of 150 hp., which affords an individual drive for the various units of the plant. There is also a 150-hp. Laidlow-Dunn-Gordon Co. air compressor which more than takes care of the drills' requirements. In connection with the engine room is a well equipped machine shop adequate for making repairs on any of the machinery in or about the plant.

The company also has an excellent water system, sufficient for all its needs, both for use in the homes of its employes and in the plant, as well as to furnish adequate protection against fire. The pump has a capacity of 500 gal. per minute and the tank, which is mounted on top of a high hill above the plant, affords a water-pressure of 150 lb. at the plant.

Every convenience has been provided for the operating staff of the organization, and all of its employes. A club office, which would do for a club house on any golf course in the country, stands on top of the hill north of the plant. To reach the office one must climb a long slightly inclined combination boardwalk and stairs of approximately 300 steps. Mr. Krippendorf, who is practically the sole owner of the company, has given expression to his sense of beauty at this point by placing a 25-ft. wall of roses on either side of the stairs. The effect resulting from this landscape gardening is beyond the ability of a ROCK PRODUCTS editor's pen.

The club office is surrounded by a screened-in porch 12 ft. wide, which is used for lounging and as sleeping quarters. Within, are individual offices for the various officials. On the third floor are eight bedrooms, each with private bath and all other most modern conveniences. The building also affords a 25x70-ft. hall for social gatherings and general get-together meetings. Officials are in intimate touch with the outside world through the installation of a large Westinghouse radio set and they claim that most of their evenings are spent in listening to jazz orchestras in Chicago, New York and other cities.

At the rear of the club-office are the post-office, general store and commissary and dwellings for the employes. All are furnished with running water and electric lights and each home has its own kitchen garden.



These fuel-oil tanks accommodate a 60-days' supply

The chief official at the operation is Col. Simon Ross, vice-president, a World-War veteran, who saw much service overseas with the 352nd Infantry of the 88th Division. Other officials are: Albert Krippendorf, president, of Cincinnati; Martin Walsh, sales manager; Herman Wanke, superintendent; Henry Beckman, construction foreman, and Lem Matthews, superintendent.

The plant is directly served by only one railroad, the Graysonia, Nashville & Ashdown, which makes connection at Ashdown with the Kansas City Southern and Frisco Lines and at Texarkana with the Missouri Pacific, Cotton Belt and Texas & Pacific railroads. The Kansas City Southern road affords the company an entry to the eastern markets via Port Arthur, while the Southern Pacific to New Orleans permits connection with Morgan Steamship Lines. The plant at the present time has a daily capacity of 10 cars of asphalt filler, three to five cars of whiting and 20 cars of agricultural lime and road-base material.

A Newspaper on Rock Products Industry

By Herbert Reid
Director, Builders Exchange, Los Angeles, Calif.

COINCIDENT with the enormous construction program in Southern California, which has been under way for the past five years, the manufacture of rock products has developed into a great industry representing millions of dollars of invested capital and providing employment for thousands of men. The heavy demand for road-building rock and concrete aggregates was a task far too great for the primitive gravel pit and it was evident that if construction was to continue without interruption more efficient equipment for producing these materials must be found.

From the old-fashioned gravel pit with its hand shovels and horse carts has come the giant rock manufactories of today. Here we find modern steam shovels doing the work of a score of men at every swoop. Motor-drawn cars carry the material to the plants, where massive machinery takes up the work of manufacture where nature left off.

Plentiful Supply

Rock, sand and gravel are about the commonest and most plentiful things on earth. They are plentiful because they are found in every section and because Mother Nature used more of them than anything else in her foundation of the universe.

It is estimated that more than $7,000,000 is now invested in pits and quarries to furnish rock, sand and gravel in Los Angeles alone. Thousands of workers are employed in the production, manufacture and distribution of rock products, to say nothing of tens of thousands more who use and handle them in various projects every day. Without these commodities there could be no modern railways, no fireproof buildings, no paved streets, reservoirs and hundreds of other things vital to our social, business and industrial life.

When industries of Southern California are casually reviewed the sand, rock and gravel industry is either completely overlooked or just barely mentioned. Yet constant production of these commodities is far more important to progress and development than perhaps any other basic material. We can only appreciate the importance of this industry by stopping to reflect upon the possible results if the supply of rock products were to be suddenly cut off.

Editor's Note

HE original of this article appears in the Los Angeles Sunday "Times" of October 7 under the caption "Rock Products Huge Industry." It is reproduced here not because it contains any information that producers of rock products do not already know, but because it is a good example of very helpful newspaper publicity, such as the producers of any locality can obtain if they go about it in the right way.—The Editor.

Manufactured Products

It does not occur to the layman, as he sees these materials used in the construction of our modern works, that they are manufactured products. But if he will take time to investigate he will find at the plants the same care, detail and efficiency as is used in the manufacture of any other commodity.

While rock, sand and gravel are commonly found in nearly every section of the country, yet their value depends largely upon their natural quality. No operation of man or machine can add to or subtract from the natural basic quality. This gives rise to the location of plants at points where nature has provided in large deposits, either separately or in combination, rock and sand of a natural quality which, by the process of manufacture, can be made suitable for construction purposes.

The manufacturing process is nothing more than a digging, carrying and refining system; large stones are blasted from mountains of solid rock, broken down in giant crushers and rollers to various sizes, screened and graded to suit the specifications of the engineer and architect. Sand and gravel are nothing more than finer divisions of rock carried down by rains and floods to the lower regions during thousands of years.

There are approximately 15,000 cu. yd. of rock, sand and gravel consumed in the city of Los Angeles every day. This represents an aggregate volume of business in excess of $12,000,000 annually. Several trains are engaged continually in this traffic and approximately 500 motor trucks are operated in the sand, rock and gravel business. This motor equipment represents an investment of more than $3,000,000.

Most for the Money

Manufacturers of rock products have the distinction of giving more for the money than any other manufacturer or merchant. Nowhere outside of the rock and sand industry is it possible to buy 2700 lb. of manufactured product for $1—yet that is what a cubic yard of rock weighs and approximately what it costs at the bunkers. Southern California enjoys the lowest prices for rock products of any metropolitan city in America. A national chart published in the August 18 number of *Building Supply News* shows that out of 41 cities in the United States, Los Angeles pays less for rock products than does any other.

Now that the manufacture of rock products has been brought to such a high standard of efficiency, it is hoped that the building ordinances, particularly those concerning residence work, will provide a better specification for concrete aggregates. The present practice of allowing "mixtures" of rock and sand in unknown proportions to be used should be condemned. Good results can only obtain in concrete construction with the use of well-graded rock and clean sand, intimately mixed with portland cement in definite proportions.

The rock products industry is deserving of a better position than has been given it in classifications in the past; and with the rapid strides of development now in progress it cannot help but receive notice as a fundamental industry in Southern California.

Questions and Answers

No. 91. **Clay in Concrete Sand.**—How much clay is permitted in good concrete sand?—W. H.

A. Most of the state highway specifications say that the clay content shall not exceed 3 per cent. The writer has seen specifications for concrete sand which was to be used in structural work that called for a clay content of less than 1 per cent. For finishing work some architects call for enough clay in the sand so that it works well and is not "short."—E. S.

No. 92. **Conveyor Belt Stretches.**—We have trouble with the 300 ft. conveyor belt of our sand and gravel plant. It stretches continually and we have to take out pieces, and finally it becomes so thin that it pulls apart. How would you advise us to overcome this difficulty?—L. B. W.

A. The trouble may come from a poor quality of belt, too high an initial tension, faulty installation or inattention. Or it may come from a combination of two or more of these things. A good belt is the very first essential for a conveyor and correspondence with any of our advertisers who make belts will insure that you get such a belt if you follow their advice. Running at too high an initial tension usually comes from too small head and tail pulleys. The belt has to be stretched tight to make it grip, as the pulleys do not furnish sufficient contact surface. The remedy is to use larger pulleys. Faulty installation may be either in a poor structure for supporting the belt or in such details as too long a spacing between the idlers. One very successful operator, whose belts last for several years, tells me the secret is in having a rigid structure, so that the belt is sure to stay in line and so that it will not be affected by vibration. The attention given the conveyor has much to do with the life of the belt. It puts a great strain on the belt if the idlers do not run, and this is sure to happen if they are not greased regularly and otherwise looked after. The return idlers are those most often neglected. Large operating companies find that it pays well to use the ball or roller bearing idlers with the self-greasing attachments, as these add so much to the life of the belt. Some of the makers of these idlers claim that a belt of one ply less thickness can safely be used with them.—E. S.

No. 93. **Diatomaceous Earth.**—Please inform me briefly as to the production, marketing and uses of diatomaceous earth.—C. M. H.

A. We intend shortly to publish an article on this subject. In the meantime, here are some of the main points regarding its production, marketing and use:

The greater part of it seems to come from the Pacific coast, although there is some production in the Middle West. The writer knows of a very fine deposit in Nevada which has recently begun production. The white earth is preferred, although for many purposes the color is not of much importance. "Keiselguhr," one grade of the powdered material, is now quoted at $50 per ton f.o.b. New York. The highest price for air-floated powder is quoted at $125 f.o.b. mines California. Material used for soundproofing is quoted at $45 to $50 f.o.b. mines.

Shipments of the pulverized forms are made in bags which cost from $4 to $4.50 per ton, this being included in the New York price. The bricks which are sawed from the crude material are packed in cartons and boxes and command a considerably higher price.

The largest use of diatomaceous earth is for a filtering material. For this purpose cheaper grades may be used, some of them selling as low as $15 to $16 per ton. Such powder runs from 12 to 17 lb. per cubic foot. It has a great many uses in the finer pulverized forms as a filler in paints, rubber, soaps and other compositions where a filler of light weight is desired. It is a mild abrasive, and as such is used in dentifices and metal polishes. It has also uses in chemical industry, such as a carrying agent for catalysts, for it is valuable owing to its chemical inertness.—E. S.

No. 94. **Barytes:** what is it, where is it found and what is it worth per ton?—F. X. C.

A.—Barytes (barium sulphate) is a rock product mined to a considerable extent in Missouri and other central states. It is used mainly as a filler for paints, rubber and other materials, such as the composition from which phonograph records are made. The latest prices are $7 to $10 for the crude and $28 to $30 for "white floated," f.o.b. St. Louis. A considerable amount is imported. To make the white floated product the crude mineral has to be ground wet and the fines separated by wet methods after which it is dried and sacked. A considerable amount is made into *blanc fixe* by fusing the crude barytes with coal, dissolving and precipitating with zinc or some other precipitant.—E. S.

No. 95. **Gypsum for Fertilizer.**—How is fertilizer made from gypsum? Does anything have to be mixed with it?—C. W. C.

A. No other preparation is required than grinding so that 60-80 per cent will pass a 100-mesh screen. This material is known as "land plaster," and has been used as fertilizer for 300 or 400 years in this country and in Europe. Benjamin Franklin was a great advocate of its use. Full details may be obtained from the Gypsum Industries, Inc., 844 Rush street, Chicago. The association has spent a great deal of time and money on the uses of gypsum in agriculture and I am sure they would be glad to send you literature on the subject.—N. C. R.

No. 96. **Uses of Silica Sand.**—We think the enclosed sample of sand is pure silica and that it ought to find a market for glass making and steel molding. Is this your opinion?—E. G. C.

A. The sand appears to the eye to be a very pure gypsum sand, but eye inspection alone is not sufficient, as silica sands are always judged by chemical and physical analysis. As little as 0.20 per cent iron will condemn a sand for the better kinds of glass, and almost any sand will do for the poorer qualities. We would advise that you send a sample to any of the testing laboratories which advertise to do such work and have an analysis made. The use for steel molding sand depends as much on the physical characteristics as the chemical analysis. Different sizes of castings require different gradings of sand. We are sure that any of the steel makers who might use your sand will be glad to advise you as to its suitability.—E. S.

No. 97. **Increasing Capacity of Revolving Screen**—We have a 36-in. revolving screen which does not seem to have sufficient capacity for the 70 yd. per hour and 1700 gpm. of water we are feeding it. How would you advise us to increase the capacity?—H. D. C.

With a heavy load present in the screen at all times, a certain amount of undersize is bound to get out with the oversize merely because it cannot get down to the screen perforations. If the plant will allow it, I think it would be well to take out a part of the undersize before sending it to the screen. The easiest way to do this is to use a flume or launder with perforations in the bottom, thus making a simple gravity screen. You will lose some water in doing this, but there should be plenty left for use in the revolving screen. This method is in use in several plants. One of these is the Springfield-Pekin Sand & Gravel Co.'s plant at Pekin, Ill., a description of which was published in the issue of Rock Products for October 6. It is always possible to get a little more out of any screen by making sure that the speed, pitch, etc., are best adapted to the material and the proportion of oversize and undersize. But this only helps matters to a limited degree, while reducing the tonnage by taking out a part is bound to increase the efficiency of the screen very considerably.—E. S.

Hints and Helps for Superintendents

Loading Tunnels vs. Bins

THE VIEWS below show how a number of California sand and gravel plants avoid the construction of overhead wood loading bins for motor trucks. Instead of bins ground storage piles over timber or concrete tunnels are provided, into which the trucks may be driven and loaded from overhead gates, as in the case of bins.

Of course, a loading system like this could not be used where the water level in the ground below was high enough to make the driveway muddy, unless the driveway were paved with concrete, as seems quite feasible. With a paved driveway and facilities for draining the sump under the pile, it would appear that this method of loading out stored material could be more widely adopted in the Northern and Eastern parts of the country. In California much of this material is screened dry, which eliminates the drainage problem.

Timber tunnel at California sand and gravel plant replaces overhead bins

Swinging Launders

IT is common practice to carry launders or chutes for loading or stock-piling sand and gravel on high trestles of rather uncertain stability. Often, of course, especially in stock-piling; the location of the launders is more or less temporary. Under such conditions the plant superintendent may do well to recall the possibilities of suspending the launders, which not only furnishes a simple method of support, but allows the launder to be moved readily and thus increases the storage facilities.

The illustrations herewith show two typical installations of suspended launders, one for barge loading, the other for car loading.

Suspended launders for barge loading

Suspended launders for car loading

Concrete tunnel under ground storage provides satisfactory method of loading motor trucks

Solving a Difficult Problem at Tompkins Cove

SOME years ago the Tompkins Cove Stone Co., of Tompkins Cove, N. Y., encountered in the rock which they were sending to their New York market, layers of crystalline matter which chemists showed were of the same elements as the rock itself. This ran in layers only 2 or 3 in. thick, and when the rock was blasted and crushed, this crystalline matter was reduced to a powder, and was put aboard the barges along with the rock.

In damp or wet weather the entire body of crushed rock on the barges was coated with this material, and then when it dried the rock had a pinkish tint. For years no objection was made to this material appearing and some of the concrete roads laid in this section show a light pink color.

In some way, however, a clause was injected into the revised state specifications which compelled the elimination of this material, the clause reading: "If a quantity of the rock is washed, the water should be free from discoloration."

This situation put the Tompkins Cove people practically out of the market for this

particular class of work. The rock itself is among the best that can be obtained in this section and is in great demand.

Dry Screens Not a Success

Many suggestions were made as to process of elimination, the first being one of a dry screening method, over vibrating screens. This helped somewhat, and might have been employed permanently had not a great quantity of small-sized material soon accumulated, for which there seemed no market. This forced them to resort to other methods.

The washing process was next thought of, and it was tried out on a small scale with good results. Consequently the Tompkins Cove Stone Co. installed two large manganese steel drums 20 ft. in diameter and 20 ft. in length, with special manganese baffle plates, complete water system and conveying units, both to and from the drums. The entire installation, with pumps and water supply cost them in the neighborhood of $80,000.

Unfortunately the drums had been located so low that the water accumulated in the pit, compelling the belt conveyors to operate under water. This water soon became saturated with the impurities and the belt conveyor was carrying away, with the rock, the very material that should have been washed away. Hence the installation was to no avail, and was abandoned after a few weeks of operation. These drums are still on the site, Figs. 1 and 2 showing them in place.

At this juncture, outside engineers were consulted, with the result that a proposal plan was drawn up and complete operating plans submitted. At that time the material was delivered direct from the crushers up an inclined belt, then over a horizontal belt to the barges at the rate of 1000 cu. yd. per hr. The average capacity is about 6000 cu. yd. per day.

On this horizontal belt there was arranged a tripper so that the material could be discharged to three revolving stone washers. The material discharged into the top of these washers was agitated, the small material, together with the impurities, being screened a second time by a ½-in. mesh jacket. The dirty water with some of the very fine material was subsequently washed away in the flume, shown in the foreground of Fig. 3. The washing machines, or revolving screens, were so arranged that any one of them could be disengaged without affecting the others. This made a very flexible unit. The washed material was again collected from underneath the discharge end of the washing screens, conveyed upward and discharged into the barges. Fig. 4 shows a close-up of the discharge end of the washers.

The plant has been operating the entire summer and has been giving entire satisfaction. It is interesting to note, also, that the parties responsible for the injection of the disturbing clause in the state specifications now find it impossible to secure as clean stone elsewhere as is obtainabe from the Tompkins Cove plant.

The washing equipment, conveyors, etc., were designed and built by the Link-Belt Co., of Philadelphia, which furnishes the above information.

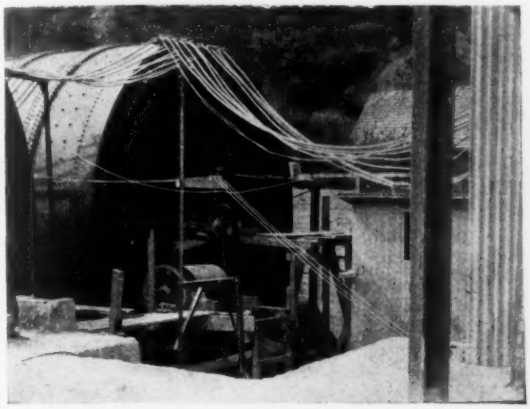


Fig. 1—Old washing drum abandoned

Fig. 2—Another view of abandoned washing drums

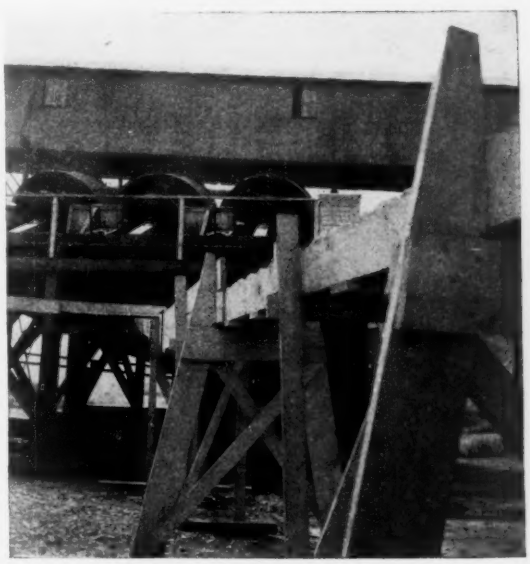


Fig. 3—New washing screens in place

Fig. 4—Discharge and drive ends of new washers

Quarried from Life

By Liman Sandrock

Mrs. Preston, of "Preston's Rock Crusher"

RECENTLY, the *Woman's Home Companion* was the recipient of thousands of letters from women who told how they had helped to lighten the home burden; who, proud of their great glory as American mothers and brave under stress of domestic hardships, still felt that, if they had "the start," they could prove their ability to the outside world. "When I can get the start," wrote one woman, "I know that I can 'carry on'!"

And this leads us up to the tale of how one woman in our man's industry could "carry on." Today, in some ways, we are wrong when we say that the rock products industry is the domain of man alone. For ROCK PRODUCTS pages in the past have furnished ample proof to the contrary. Woman has entered this field and made here indelible mark in it. Doubtless you will remember what this magazine has said in praise of the accomplishments of such women as Miss Mary E. Squire and Doctor Carpenter of the Allwood Lime Co.; Mrs. H. E. Roth, president of the Sheboygan Lime Works; Mrs. Grace M. Evans, of the Monon Crushed Stone Co.; Miss Claudia M. Sargent, of the Charles Warner Co.; Miss Cummins (now Mrs. Fitler), of the Urbana Sand and Gravel Co., to recall a few of them.

Well, when Editor Rockwood returned the other day from his interesting trip to the Pacific Coast, he came armed with data on the good work being done by Mrs. Alice B. Preston, founder of "Preston's Rock Crusher." And Mr. Rockwood has delegated us to tell the story to you. This good lady knew that she could "carry on" if given the chance. And she got it!

Some years ago Mr. and Mrs. G. W. Preston lived in Columbus, Ohio. Prior to her marriage Mrs. Preston had an introduction to the sand and gravel industry as a bookkeeper for an uncle who was a pioneer in the industry there. At the time he met his wife-to-be Mr. Preston was a railway man. As sometimes happens they got the California infection and went out to Los Angeles, accompanied by their three kiddies.

The sand and gravel industry interested them after they were there for a while, so they started a small plant which soon became known as "Preston's Rock Crusher," and although we are getting a bit ahead of our story, it is still so known even though it now produces close to 1000 tons a day and can show a profit of many thousands of dollars.

The pit is located at La Manda Park, near Pasadena, and contrary to many pits in the Middle West and the South, is at

Mrs. Alice B. Preston, general manager of "Preston's Rock Crusher"

the foot of a beautiful mountain range. Mrs. Preston is greatly attracted to the mountain scenery which frames the plant. Sometimes we like to believe that the Builder of the Universe in His infinite wisdom so builded that His children, deep in the toils and burdens of life, could imbibe fresh courage and strength from the sight and companionship of His handiwork.

In the early days Mrs. Preston helped

"Preston's Rock Crusher," Pasadena, Calif.—a gravel plant

out as an assistant to her husband—as a bookkeeper. But gradually she acquired a very comprehensive knowledge of the whole business and fitted herself to assume larger responsibilities until today she is the general manager of the plant and takes care of its entire production, the shipping, and the like. She knows every minutest detail of the business. She's a first-class, all-'round "gravel man." Has she "carried on"? Yes—and she "got her start."

Mr. Preston handles the selling end of the business; the kiddies are kept busy with their studies at school. Perhaps this brief disposal of the rest of the Preston flock does not meet with your approval? But are we not writing about the lady "sand and gravel man" rather than the Preston family? Who knows but that some day we will have a corking good story to tell you about Pa Preston and those wonderful Preston kiddies.

Seeing a good opportunity to increase her business activities, Mrs. Preston has recently become secretary and treasurer of the Southern California Shope Brick Co.—and this particular type of brick is good foundation for a big business structure, we will venture to predict. Already this young company has undertaken to build a sixty-unit Shope brick plant that will turn out approximately 200,000 brick a day. Another opportunity to show that women may become just as good men as we are—and as Conan told the devil, "and perhaps a dumsight betther!"

Considerably More Truth Than Poetry

John had a pick, red lantern and cart,
Twenty thousand too low on the job from the start,
Gave bond for the work with a big red seal
And his letter head made you think he was real.
Steam shovels and mixers even wheelbarrows and scrapers
He had everything needed printed right on his paper.

Now the work went slow as bad jobs do
And the department started to put on the screws.
John started to holler about estimates small
And clear across the state you could hear him squall.
Now to show you the moral if you are not too tired,
To make a bad contract TWO are required.

—Highway Builder.

"Look 'Em Over!"

THIS inviting headline starts off the display ad of Beder Wood's Sons in a recent edition of the Moline *Dispatch*. These sons are advertising their coal business, although we all know them as sand and gravel producers, too. On the left-hand side of the ad one is told: "Frost is on the pumpkin—Phone 140"; on the right: "Ducks are flying south—Phone 140."

And then follows Good Enough lump, Hiawatha lump, and Greenback lump, which we are told are "Coal that made 'Old Hickory' famous." Wish we could reproduce the novel juggling of the name at the bottom of the ad, but the big "B" in Beder has an "e" below it; the Wood's an "ell," and the Sons has "erved." Get it: "Be Well Served." Well wager a lump of greenbacks that these Sons are getting business from such novel advertising.

Editorial Comment

Big Plants and Little Plants

Sporting authorities are agreed that a good big man can lick a good little man, but it does not follow that a good small plant, in the industries which this paper represents, cannot hold its own against the large plant. In fact, the evidence is all the other way. The large plant must supply a large area to get a market for all its product and here is where the all important matter of freight rates comes in. If the large plant can produce material enough cheaper so that it can pay a higher freight rate, it can come into competition with a small plant that is nearer the market. But this rarely happens. It is often found that the same person is the manager, superintendent, and perhaps the accountant and master mechanic in a small plant, which means a low salary list and, where this person is also the principal owner, an economic administration all around. Hence the production costs in a small plant are often quite as low as those of a large plant in the same field. A designer of sand and gravel plants throughout the country tells ROCK PRODUCTS that his observation is that the tendency today is toward the small plant supplying a limited market.

Unit Idea in Design

Apropos of the foregoing discussion is the *unit idea* in plant design. A considerable number of plants in the rock products industry seem to have been more or less failures because they have been designed to produce a larger capacity than the immediate conditions under which they were to be operated justified. An operator estimates that he can develop a business of 3000 tons per day, even if he has no market for the time being of more than 2000 tons. He figures a 3000-ton plant will not cost a whole lot more than a 2000-ton plant, and that he might as well provide for the capacity he expects to develop.

This may be good business if he really can develop the 3000 tons within a reaonable time, and the future market conditions give reasonable assurance of maintaining this production. On the other hand, every day he operates his plant on 2000-ton or 1500-ton basis will probably cause him a loss. All his costs are practically the same for 2000 tons as for 3000 tons. He is therefore sorely tempted to throw the extra 1000 tons on the market at any old price to move it, cutting his competitors' throats, and eventually demoralizing his own business as much or more than theirs.

A better way of providing for large capacity of doubtful demand, as the big copper mines in the far West have proved, is to build plants of parallel units—sometimes as many as six or more. For example, if a sand and gravel producer wishes a maximum capacity of 3000 tons per day he can build a plant with three parallel and complete receiving, conveying, crushing screening and sizing units, any one or all of which may be operated, but if only one is operated it is not necessary to expend the power cost of operating all three, nor the cost of wear and tear on all three; and in all probability, if such a plant is properly designed, there is an appreciable labor saving when operating one or two of the units as compared with operating all three.

A plant deigned on the parallel unit idea represents a greater first cost, but as operators grow more experienced they realize that first cost is comparatively insignificant as compared with production cost; and that production cost is so vitally affected by the amount of production that an initial investment which will show a real saving in production cost, during periods of enforced low production, is one of the best investments that they can make.

Another method of providing for greater production economically is to make the most of a moderate-sized plant. Instead of operating 200 days a year, operate 300, whether orders are coming in or not. Stock your material. The decreased production costs will generally more than offset the extra cost of rehandling. A 250-ton-per-day plant on this basis can be made to produce 500 tons a day on two shifts, and produce this amount for a whole lot less than a plant designed to produce 1000 tons per day can produce the same 500 tons, under average conditions.

Concrete in Tall Buildings

It has been the firmly held belief of some architects and builders that reinforced concrete would never supplant structural steel for tall buildings on account of the large size of the columns that would be necessary to support such structures. But as the theory of concrete construction is better understood the wider becomes its use and the taller and heavier are the concrete structures which are erected. The Medical Arts building, in Dallas, Texas, is at present the highest. It has 19 stories and is not only notable for its height but because it is one of the handsomest buildings in the country. Dayton, O., is building a 21 story building which will be complete some time before the end of this year. Earlier engineers placed little reliance on concrete structures, but this came from their experience before the requirements of good concrete aggregates were understood. The tall concrete building, and the lack of failures in concrete construction today are quite as much to the credit of the producers of clean, graded aggregate as to designers.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning October 29:

Central Freight Association

7311. Sand, Chicago to C. F. A. territory. Present: As published in C. F. A. Trf. 197F and individual lines' issues. Proposed: (a) To eliminate from C. F. A. L. Trf. 197F rates on blast, engine, foundry, glass, molding or silica sand, C. L.; also to correct tariff of individual roads naming rates on sand so that same will only apply on molding and silica sand and apply only as proportional rates on traffic originating beyond Chicago. (b) To revise minimum weight in C. F. A. L. Trf. 197F to read as follows: Ninety per cent of marked capacity of car; except when car is loaded to full cubical or visible capacity, actual weight will apply. Also to make a similar correction in minimum weight applying in connection with rates on sand from Ottawa district as published on pages 13 and 14 of Agent Boyd's Trf. 41-M.

EXHIBIT "A"

Applying on slag; slag, furnace; slag, furnace, crushed. Minimum weight 40,000 lb., except when marked capacity of car is less, in which case the minimum weight will be the marked capacity of car. From Detroit, Ecorse, West Detroit and Wyandotte, Mich.

To	In cents per ton of 2000 lb. Present Interstate	Proposed Interstate
Albion, Mich.	$1.26	$ .95
Allegan, Mich.	.....	1.23
Ann Arbor, Mich.	1.13	.70
Battle Creek, Mich.	1.64	1.05
Bay City, Mich.	1.64†	1.00†
Brigdewater, Mich.	.....	.87
Brooklyn, Mich.	.....	.97
Cement City, Mich.	.....	.97
Charlotte, Mich.	1.64	1.00
Durand, Mich.	1.13	1.13
Eaton Rapids, Mich.	1.26	.95
Flint, Mich.	1.13†	.90†
Grand Rapids, Mich.	2.02	1.15
Hastings, Mich.	1.89	1.10
Holly, Mich.	1.13†	.80†
Homer, Mich.	1.26	.95
Howell, Mich.	1.13	.80
Ionia, Mich.	1.64†	1.05†
Jackson, Mich.	1.13	.90
Jerome, Mich.	.....	1.02
Kalamazoo, Mich.	1.64	1.10
Lansing, Mich.	1.26	.95
Lapeer, Mich.	1.13	.80
Manchester, Mich.	.....	.82
Midland, Mich.	1.76	1.05
Monroe, Mich.	.63	.70
Mt. Clemens, Mich.	.76†	.74†
Otter Lake, Mich.	1.39	.90
Owendale, Mich.	1.76	1.12
Owosso, Mich.	1.13	1.02
Oxford, Mich.	1.01	.75
Plainwell, Mich.	.....	1.27
Pontiac, Mich.	1.01†	.70†
Port Huron, Mich.	1.13†	.92†
Rochester, Mich.	.70†	.70†
Saginaw, Mich.	1.64†	1.00†
Saline, Mich.	.....	.87
Schoolcraft, Mich.	.....	1.27
Sibley, Mich.	.....	.54
Three Rivers, Mich.	.....	1.10
Wayne, Mich.	.76†	.58†
Wyandotte, Mich.	.63*	.54*
Ypsilanti, Mich.	1.01	.66

*Rate will not apply from Wyandotte.

†Rate will apply from Ecorse only.

7316. Slag, Cleveland, Ohio, to Chicago, Ill., and points in Chicago district. Present, 24 cents; proposed, 18 cents.

7336. Sand, Michigan City, Ind., to Lancaster, Ohio. Present, $2.77 per net ton; proposed, $2.90 per net ton.

Illinois Freight Association

1781. Crushed Stone, C. L., 76 cents per net ton from Kankakee and Lehigh, Ill., to Effner, Sheldon, Eastburn, Watseka, Crescent City and Leonard; 80 cents to La Hogue and Piper City; 95 cents to Forrest, Fairbury, Weston, Chenoa, Meadows, Gridley, Enright, El Paso, Secor and Eureka; and $1.01 to Cruger, Washington, Farmdale, East Peoria and Peoria, Ill.; 50 cents from Perkins, Ind., to Effner; 66 cents to Sheldon, Eastburn and Watseka; 76 cents to Crescent City; 80 cents to Leonard and Gilman; 88 cents to La Hogue, Piper City and Chatsworth; 95 cents to Forrest, Fairbury, Weston, Chenoa, Meadows, Gridley, Enright, El Paso, Secor and Eureka; and $1.01 to Cruger, Washington, Farmdale, East Peoria and Peoria, Ill.

Southern Freight Association

11490. Cement, C. L., from Fordwick, Va., to Southern Ry. stations, viz.: Statesville, N. C., and stations on Taylorsville Branch. It is proposed to advance the present rate of 22½ cents to 23 cents from Fordwick to Statesville and to reduce the present rate of 25 cents to 23 cents per 100 lb. to Southern Ry. Taylorsville Branch stations, Loray to Taylorsville, N. C., inclusive, so as to effect the same relative adjustment as is in effect from other cement-producing points in the South.

11496. Clay (not earth or metallic paint), C. L., from New Orleans, Port Chalmette, La., Gulfport, Miss., Mobile, Ala., and Pensacola, Fla. (applicable on import traffic from wharf portals only), to Nashville, Tenn. Present rate, $8.40 per net ton (Class "A"); proposed rate, $4.84 per net ton, same as rate from South Atlantic ports.

11511. Lime-Sulphur Solution, C. L., from Fort Valley, Ga., to Georgia points named below. Sixth class rates now apply. Proposed rates: To Culloden, 11 cents; Jolly, 14½ cents; Plains, 18 cents; Andersonville, 11½ cents, and Griffin, Ga., 14½ cents per 100 lb. Proposed rates are based on scale submitted by carriers to the Georgia Public Service Commission, less 10 per cent.

11521. Slag, C. L., from Birmingham, Ala., and group to Panama City, Fla., and intermediate A. & St. A. B. Ry. stations to, but not including, Cottondale, Fla. Present rate, $2.75 per net ton; proposed rate, $2.30 per net ton.

11523. Cement, natural or portland (building cement); Lime, common hydrated, quick or slack; or Plaster, wall building, molding, fancy or decorative (including plaster of paris), in packages provided for straight carload shipments in Southern Classification, in mixed carloads, minimum weight 50,000 lb., from Birmingham, Ala., and group to Northern Alabama Ry. stations. No specific rates now in effect on mixed carload shipments. It is proposed to establish rates on mixed carload shipments as described above on basis of mileage scale proposed by carriers to the Alabama Public Service Commission for joint haul, less 10 per cent. The proposed rates range from 12½ cents for 50 and over 40 miles up to 16½ cents per 100 lb. for 150 and over 130 miles.

11532. Cement, C. L., from Ohio River crossings, etc., to Knoxville, Tenn. Present and proposed rates: From Cincinnati, Ohio, Lexington and Louisville, Ky., present 15 cents, proposed 16 cents; Evansville-Cairo group, present 18 cents, proposed 19 cents; St. Louis, Mo., group, present 25 cents, proposed 26 cents; Memphis, Tenn., present 16 cents, proposed 17 cents per 100 lb. Rates from other points usually grouped with these crossings to be correspondingly revised. Rate from Nashville, Tenn., to Knoxville, Tenn., was recently revised to basis of 16 cents per 100 lb., and it is proposed to revise the present rates from Cincinnati-Louisville group to basis of 16 cents in order to clear the Fourth Section and making corresponding increases from other crossings in order to maintain the present relationship.

Southern Freight Association

11541. Slag, C. L., from Birmingham, Ala., and group, Alabama City, Gadsden and Anniston group to St. Petersburg, Fla., and stations on the Tampa & Gulf Coast Ry. between Tampa and St. Petersburg. Present rate: To Gulf Coast Junction, Goldstein, Lake View, Ryalls Spur, Tarpon Junction and Rebro, Fla., $3.60; to other destinations named, $3.72 per net ton. Proposed rate, $3.27 per net ton, arrived at by making the same reductions under the present rate on slag as is brought about in the rate on crushed stone from the above points to St. Petersburg by the use of the recently published proportional rate on crushed stone from Jacksonville to St. Petersburg of $1.54 per net ton.

11546. Lime (calcium) acid phosphate of, or lime (calcium), other than acid phosphate of, in bulk in bags or barrels, C. L., mininmum weight, 30,000 lb., from Charleston, S. C. to Mobile, Ala. Present rate 74½ cents per 100 lb. (class 6); proposed rate, 52 cents per 100 lb., same as rate in effect to Ohio River crossings and Memphis, Tenn.

11547. Gravel, C. L., from Tennessee River, Tenn., to Memphis, Tenn. Present rate, 79 cents per net ton (intrastate); proposed rate $1.13 per net ton (applicable on intrastate traffic only), made same as rate from competing points of Paducah, Ky., and Spruce Pine, Ala. The present rate was established as result of erroneous information.

11548. Stone, crushed, or broken, C. L., from Alcoa, Tenn., to L. & N. R. R. Knoxville division and branch stations. At present, Class A rates apply. It is proposed to establish rates made same as from and to equidistant points on the L. & N. R. R. Proposed rates to representative destinations: To Vestal, Tenn., 80 cents; Chandler, Tenn., 70 cents; Madisonville, Tenn., 90 cents; Etowah, Tenn., $1.00; Marmor, Tenn., 80 cents; Maryville, Tenn., 70 cents; Pellico Plains, Tenn., $1.00; Athens, Tenn., $1.10 per net ton.

11591. Crushed stone, sand and gravel, C. L., from Park Avenue Stations, Norfolk, Va. to stations on Electric Division, Norfolk Southern R. R. in Virginia. It is proposed to reduce the present rates to be no higher than the rates applicable from Berkley Station, Norfolk, Va.

11600. Sand and gravel, in bulk, in straight or mixed carloads, minimum weight marked capacity of car, between M. & O. R. R. stations south of Cairo, Ill. on interstate traffic. It is proposed to revise present rates to be on basis of the proposed Georgia Mileage Scale, which will result, generally speaking, in reductions.

New England Freight Association

5359. (1) Gravel, screened, (2) Sand, building, common, or run of bank, (3) Stone, crushed, from Lenox Dale, Mass., to Pittsfield, Mass. (1) 55 cents per net ton; (2) 51 cents per net ton; (3) 55 cents per net ton. Reason: Motor truck competition.

Southwestern Freight Bureau

9839. Granite or stone, etc. To establish rate of $5.34 per ton of 2000 lb. on granite or stone; viz., paving, curbing, flagging, foundation or building stone, cut to dimension, but not sawed, sandrubbed, slushed, polished, nor carved; or rough unfinished quarried blocks, C. L. minimum weight 40,000 lb., from Conyers, Lithonia, Redan and Stone Mountain, Ga. to Kansas City, Mo. Remarks: Shippers of stone at quarries named state that there will be a regular movement of paving and curbing stone to Kansas City provided a reasonable rate is established, and the suggested rate of $5.34 is satisfactory to the shippers.

9846. Bituminous rock. To establish mileage scale of rates on bituminous rock crushed or not crushed, C. L., minimum weight marked capacity of car, from Baton Rouge, New Orleans, North Baton Rouge, La., to points in Louisiana west of the Mississippi River on the L. R. & N. Co., the same as shown on page 567, S. W. L. Trf. 58N, and to points in Arkansas and Louisiana on connecting lines proportional mileage rates, as published in Item 7160 of S. W. L. Trf. 58N, the proportional rate to apply on shipments originating in the state of Kentucky. Remarks: Shippers contend they should be entitled to the same single and joint line milage scale of rates from Baton Rouge as now applicable from Memphis, Tenn., and Vicksburg, Miss.

9904. Cement-plaster, etc. To establish the following rates in cents per 100 lb. on cement-plaster, etc., carloads, from Acme, Agatite, Hamlin, Texas, etc., to stations on the N. I. & N. R. R.: To all stations except the Jefferson Island branch, 24½ cents, to stations on the Jefferson Island branch, 26 cents. Remarks: This proposal contemplates reducing the rates at points on the N. I. & N. R. R. to meet the rates of the Southern Pacific Lines at competitive points, and at local points to clear Fourth Section.

Amendment 1 to 9346. Lime. To provide for the same reduction in rates on lime, carloads, minimum weight 30,000 lb., from Watts, Okla., to Oklahoma points, as proposed in Docket Advice 9346, from Johnson, Ark.

Trunk Line Association

11726. Clay, crude or ground (common or fire), C. L., minimum weight 60,000 lb., marked capacity of car to govern if less than the minimum. Rule 24 of Official Classification not to apply, from Toland, Pa., to Camden, N. J., $2.70; to Elwood, N. J., $3.10; to Trenton, N. J., $2.75; Kentmere and Wilmington, Del., $2.95 and North Wales, Pa., $2.40 per 2000 lb.

11730. Lime, common, hydrated, quick or

slake... C. L., minimum weight 30,000 lb., from Staunton, Indian Rock and Eagle Mountain, Va., to Philadelphia, Pa., $4.50 per 2000 lb.

11728. Cement, common, hydraulic, natural or portland, C. L., minimum weight 50,000 lb., to Fifth Avenue (Scranton), Pa., and Scranton, Pa., from Portland Point, N. Y., 14½ cents per 100 lb.

Western Trunk Line

3472. Sand, C. L. From Lawrence, Kan. to Kansas City, Mo. Present, 5 cents per 100 lb.; proposed, 4 cents per 100 lb. Minimum weight, 90 per cent of the marked capacity of car; except when weight of shipment loaded to full visible capacity of car is less than 90 per cent of the marked capacity of the car the actual weight will apply, but in no case shall the minimum weight be less than 40,000 lb.

3364. Stone, except granite and marble, rough quarried, C. L. From Pueblo, Colo., to New York, N. Y., via rail and ocean route. Present, 75 cents per 100 lb., minimum weight 42½ cents at 40,000 lb., balance at 50,000 lb.; proposed, establish rate of 61 cents per 100 lb. Minimum weight 50,000 lb.

496A. Limestone (ground) in barrels or sacks, C. L., from Weeping Water, Neb., to Chicago, Ill. Present, 16 cents per 100 lb.; proposed, 18 cents per 100 lb. Minimum weight 40,000 lb.

Shows Overburned Lime Is Cause of "Popping" in Plaster

LIME which has been overburned or which has been burned during hydration is the cause of popping in plaster, tests made at the Bureau of Standards have shown. In this type of failure small particles appear to expand and push themselves out of the plaster, leaving tiny holes. In extreme cases these holes may be sufficiently large or numerous to be unsightly. It has been shown that popping will not be serious if the lime is ground fine enough to pass a number of 50 sieve, as in that case the lime will be completely hydrated during the mixing and application, or else the particles of defective lime will be too small to cause noticeable holes.

These tests were made in co-operation with the National Lime Association, the Contracting Plasterers' Association, and the International Plasterers' Union. Ninety-eight panels were erected containing different impurities in different sized particles. It was found that, with the possible exception of sand, impurities other than overburned lime did not cause popping no matter how coarse they were.

Project for a New Cement Plant at Rockwood, Tennessee

PLANS for the erection of a million dollar cement plant at Crab Orchard, near Rockwood, Tenn., that have been under way for more than six months point to actual construction work at once. Recently Chairman J. F. Brown was in receipt of a letter from James O. Parker advising him to make out the deed for the 30 acres of land owned by the county at Crab Orchard, as he wished to exercise his option on the purchase of the property.

At the April term of court, Mr. Parker went before the county court explaining something in detail of his proposed project of building a cement plant at Crab Orchard at a cost of $1,000,000 or more. He wished to purchase the 30 acres of land adjoining the plant of the Southern States Lime Corporation. His reason for wishing to erect the plant there was that he would be able to handle the larger part of the materials necessary for the making of cement by gravity, thus making production much cheaper. He further stated that this location is much closer to the railroad. Mr. Parker proposed to give the county $1000 for the property, that being what the property cost the county several years ago.

The court gave Mr. Parker an option on the property for six months at the price named.

Some weeks ago Mr. Parker went East to raise funds for building the plant. He purchased what is known as the Sisson property, consisting of 10,000 acres of coal and timber land adjacent to Crab Orchard. This purchase was made to secure an abundant supply of coal and timber land and also to get control of the shale bed that is necessary, along with the limestone, in the working of cement.—*Chattanooga Times.*

Hotel Chase, St. Louis, Will House Sand and Gravel Convention

HOTEL CHASE in St. Louis has been selected for the eighth annual convention of the National Sand and Gravel Association. This is one of the newest and finest hotels in St. Louis and is exceedingly well adapted for convention purposes. Room rates are reasonable and all rooms have private baths. It is expected that the attendance to this convention will be large so that reservations should be made early.

Activities of San Joaquin Portland Cement Company

HAVING satisfied themselves as to the extent and quality of the limestone deposits near Three Rivers, Tulare county, Calif., officials of the San Joaquin Portland Cement Co. are bringing to a close the extensive exploration work which they have been conducting for the past few months, and it is expected that as soon as the engineers' reports are all in, the exact location of the proposed 3500-bbl. cement plant will be decided upon and actual construction started.

Officials of the company and other men closely associated with the project—G. F. Hamburg, former vice-president and general manager of Haekfield & Co., Honolulu, importers and shippers; F. A. Parker and Herbert Coffman of the Old Mission Portland Cement Co., and a civil engineer—on a recent visit here expressed themselves as being highly pleased with the result of the investigation. They were assured by the company engineer, G. S. Dean, who has conducted the exploration work, that in one small portion of the holdings there is enough lime to supply the proposed plant for 85 years.

The exploration work has been conducted by means of core drilling, done by the Diamond Drill and Contracting Co. of San Francisco. Holes from 256 to 517 ft. deep have been drilled at an angle of from 7 to 26 deg. through the mountain side at various points, and tests made of the core every 5 ft. The ninth and last hole, which is being completed this week, will bring the total of core drilling to 1500 ft.

While these holes have been drilled primarily for the purpose of determining whether the lime deposits were extensive enough to warrant the building of the proposed plant, they will also help to determine the trend of the quarry when operations begin.

The cement plant, which will be strictly modern and equipped with the most improved cement-making machinery, may be located in Three Rivers or at some point in the valley, but in either event, a railroad will be built from Lemon Cove to Three Rivers.

Two routes are under consideration: One up the north side of the Kaweah river and the other following the present paved highway on the south side of the river. The survey, which was made some time ago, crosses the highway too many times to be practical, and plans are under way for reconnaissance surveys of the two routes now under consideration.—*Fresno Bee.*

Federal Building Program to Be Resumed

ACCORDING to the Dow Service building reports, the newest phases of the trend of building and of building material supply in 1924 include the government's intention, backed up with President Coolidge's approval, for the resumption of the Federal building program. It is planned forthwith to budget $3,000,000 to $5,000,000 annually for government building programs, but there are still great appropriations set aside a year or more ago when, because of lack of labor and dearth of materials. Forthcoming activity of heretofore deferred federal building programs may be expected to be financed from these funds.

National construction, plus the Japanese temporary and permanent building material requirement, will bulk large in 1924. Building material production probably was pushed as near to manufacturing capacity this year than it ever has been. Cement manufacture, in September, for example, eclipsed all previous records for any single month. The total was 13,000,000 bbl. The nine months production of this single building material was 101,000,000 bbl. greater than for any entire year's production prior to 1922.

Tunnel Blasting for Quarries*

"Coyote Hole" System of Firing Big Shots Used in the West in Place of Blasting with Well-Drill Holes

TUNNEL blasting does not mean the kind of blasting that is done in driving tunnels for railroads through mountains. It refers to a peculiar kind of blasting which is done in the Western states which is quite different from the practice on the Atlantic side of the continent.

Quarrymen in the East use small size drills put down bore holes only about 1½ in. in diameter and load dynamite, stick after stick and fire 20 or 30 such holes at once. This may bring down as much as 4000 or 5000 tons of rock. (Some more progressive quarrymen in the East by means of well drills put down holes nearly 6 in. in diameter to a depth of 100 ft. or more, load them up solid with dynamite and bring down 30,000 or 40,000 tons of rock at a time.)

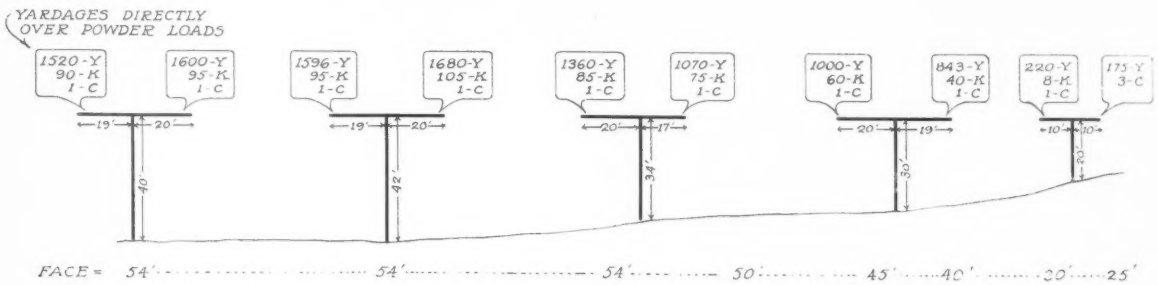
On the Pacific coast, in the land of the big trees, big rivers and big ideas, the progressive quarryman drives a hole directly into the face of the rock big enough for him to crawl into, sometimes 4x6 ft. in area, and drives these tunnels sometimes as much as 60 ft. directly into the rock and then drives two tunnels at right angles to them on the same level and loads these large holes with an enormous amount of explosives. Colloquially, such a tunnel is known as a "coyote hole" from its fancied resemblance to the coyote's home in the rocks.

In one unit, of pile, there may be several hundred kegs of blasting powder and several hundred pounds of dynamite to act as primers for it to break the kegs and start the explosion of the blasting powder, which latter is not poured out in bulk out of the kegs, but stacked up directly in the kegs. After they are loaded, these tunnels are filled, usually with the material which was taken out of them in the construction. This results in very economical blasting, heaving the rock both out and upwards, breaking it up into such shape that it can be readily handled by large steam shovels.

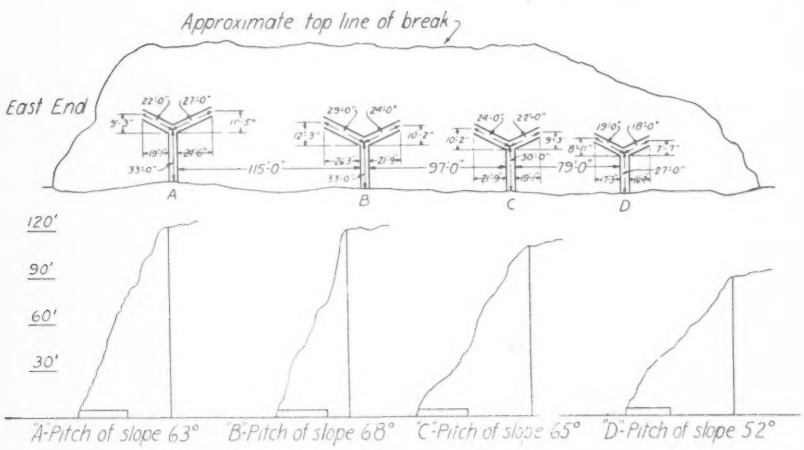
The attached sketch shows method of a shot at St. Helens, Ore., of moderate size as far as the amount of explosives and yardage of rock is concerned, but interesting as an example of multiple tunnel blasting, that is, where several "T" shaped tunnels are fired together. J. F. Krafsic of the Seattle office of the du Pont Co. was in charge of the shot.

Some years ago, after a thorough investigation of all the available sites, the Northern Pacific established a quarry at Veazie, Wash., about 37 miles from Tacoma, on what is known as its Buckley branch. The quarry was worked by various methods until the early part of 1922, when, in an endeavor to reduce costs, it was decided to try the "coyote hole" system. Conditions at this quarry were especially favorable for working it in this way, the formation being a very hard and blocky basalt. After some consultation two tunnels 3x3 ft. were driven into the face of the quarry; two crosscuts were driven from the end of each tunnel and a pocket made at the end of each crosscut to receive the explosive charge. The crosscuts on the west sides of the tunnels were driven at right angles to the tunnel line, while those on the east side were driven at an angle of 115 deg.

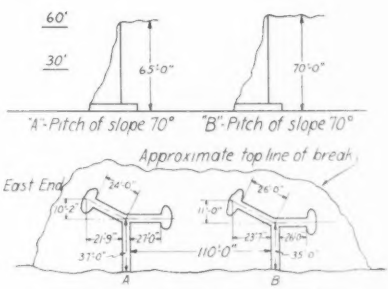
A total of 452 kegs of black blasting powder and 1900 lb. of 40 per cent nitroglycerin dynamite were loaded into the four



Diagrammatic sketch of loadings for proposed blast at St. Helens, Ore.



Plan and profiles of coyote holes for blast of August 10, 1923



Profiles and plans of earlier shots

*Text and pictures from the du Pont Co.

pockets. The distribution of the charge and the pockets are shown in one of the drawings. The powder was loaded in the pockets without being taken out of the kegs. Each keg was laid on its side with the seam down to insure that no water reached the powder in case seepage should develop and a keg proved defective. The dynamite was taken out of the cases and loaded in the center of the black powder charge. Two cartridges of dynamite in each charge were primed with No. 6 electric blasting caps. The electric blasting cap wires were extended with No. 20 connecting wire. Each electric blasting cap in an east side crosscut was connected in series to an electric blasting cap in the adjoining west side crosscut, making two independent circuits. This was done as a safety measure in case one circuit should be broken. Clay was spread along the floor of the tunnel and crosscuts and all four wires were brought out on the west side of the tunnel. The wires were laid on the clay spread on the bottom of the crosscuts and tunnel and protected by boards laid on top of them, a supply of old 1x6-in. lumber being used for this purpose. The crosscuts and tunnel were then tamped solidly with a mixture of damp clay and fine rock from the muck produced in driving the tunnels. When both tunnels were loaded and tamped all eight electric blasting caps were connected in one series and fired with a blasting machine.

This shot broke something more than 30,000 cu. yd. of rock or almost 2⅔ cu. yd. for each pound of explosive used. The results were so satisfactory that work was immediately commenced in preparation for another shot to consist of four tunnels with two crosscuts on the end of each tunnel. These tunnels and crosscuts were the same size as those driven for the first shot, but no pockets were cut at the ends of the crosscuts. All crosscuts were driven at an angle of 115 deg. to the line of the tunnel. A total of 620 kegs of black blasting powder, 3050 lb. of 20 per cent stumping powder and 100 lb. of 60 per cent nitroglycerin dynamite was loaded in this shot, distributed as shown in the second drawing. All black blasting powder was loaded into the kegs and the kegs laid on their sides with the seam down, while the dynamite was taken out of the cases. The method of loading was as follows:

Nine kegs of black blasting powder were stacked up, three kegs wide and three kegs high, against the face in the end of the crosscut. Three other kegs were laid on the bottom of the crosscut, butting up against the first pile and forming the bottom row of the second pile. Then a keg was placed on top of each side keg of this first row, leaving a space in the second row where the middle keg should be. Stumping powder was placed in this space and the pile filled out with black powder. This having been done, a third pile was started in the same way, the space between the first and third piles then being filled with stumping powder. This program was continued until the entire charge was loaded. Both black powder and dynamite were packed in snugly. Near each end of the stumping powder charge was place a 6¼-lb. bundle of 60 per cent nitroglycerin dynamite primed with a No. 6 electric blasting cap. This was to insure thorough detonation.

This method of loading stretched the explosive charges from the end of the crosscuts to within 10 or 15 ft. of the junctions of the crosscuts with the tunnels.

This shot was fired on August 10 and the engineers estimate that it brought down over 50,000 cu. yd. of rock or about 2⅔ cu. yd. to the pound of explosive. As indicating further the success of the work, it may be stated that the power plant, blacksmith shop and other buildings stand directly in front of the quarry and only about 200 ft. from the face of the quarry and that about 50 ft. beyond these buildings are the Northern Pacific tracks and a high-tension electric power line. In neither of these shots was any rock thrown out of the quarry yard and no damage was done to property or buildings.

WHAT IS HOLDING BACK YOUR SALES?

William R. Basset, President
Miller, Franklin, Basset & Co., Inc.

IT IS shortsighted to consider that sales depend solely on the activity and ability of the sales department. Sometimes when sales are less than they should be the fault is with the factory, the credit department, or the financial policy.

Just recently I was asked to make an investigation to determine why a certain manufacturer sold only about half of what he should. The sales force was well trained and well managed, the advertising was excellent, the product was of good quality and the price was low. Bad debts totaled only one-half of 1 per cent. The net profit on sales averaged about 18 per cent after deducting all expenses except credit losses.

I had a talk with the sales manager and the credit man and found out that nearly half of the orders taken were turned down because the credit manager would play only the sure things. The existing plant could easily handle double the production, and the salesmen could certainly get double the volume of orders if they were allowed to take them from concerns that presented only the ordinary credit risks.

A careful study of the market showed that in all likelihood doubled sales would raise bad debt losses only to 3 per cent. With an 18 per cent margin of profit, 3 per cent could be easily absorbed with no serious effect.

A year's trial showed that the policy was sound and that the forecast as to sales and credit losses was accurate. Net profits at 18 per cent of the sales are now $300,000 a year as against $175,000 formerly. Sales are now $2,000,000 a year instead of $1,000,000.

This is a condition that exists frequently. Aside from the direct loss of profits, it is serious in other ways. A "tight" credit man discourages the salesmen more than any other one thing. And if the plant is only partly active there is another loss in the overhead due to under capacity operation.

An intelligently high bad debt loss may be like bread cast on the waters—it will come back many fold in profits.

Magnesium and Calcium "Agstones"

ONE hundred pounds of magnesium carbonate will neutralize (overcome) as much soil acid as 120 lb. of calcium carbonate, or 1 lb. of magnesium carbonate equals in neutralizing value (ability to overcome sourness) 1.2 lb. of calcium carbonate. Therefore, the neutralizing value expressed as calcium carbonate is obtained simply by multiplying the per cent of magnesium carbonate by 1.2 and adding the product to the per cent of calcium carbonate. Example: A limestone contains 54 per cent calcium carbonate and 44 per cent magnesium carbonate. What is its neutralizing value expressed as per cent of calcium carbonate? Answer: 54 plus (44 times 1.2), or 106.8 per cent calcium carbonate.

Besides limestone there are two other excellent sources of agricultural lime; namely, air-slaked lime or screenings from burnt lime and marl. When shipped wet they are hard to handle; besides carrying considerable water which is, of course, so much dead weight. These products, when bought at a reasonable price and under a guarantee of less than 10 per cent moisture, are very desirable on account of their excellent mechanical condition—high degree of fineness. Aside from fineness, pure air-slaked lime has the same value as pure limestone, but burnt lime has 1.8 times the neutralizing value of pure limestone. Since air-slaked lime usually contains considerable unslaked burnt lime its neutralizing value is as a rule much higher than that of limestone.—*W. H. Strowd, Wisconsin Department of Agriculture in Hoard's Dairyman.*

Unusual Bid on Portland Cement for State of Missouri

Great Western Portland Cement Company Offers Cement at Cost in Exchange for Contract

THE frank and open attempt of a portland cement manufacturer to cash in on the lower cost of production in his general commercial business by the assurance that one-fourth of his plant's capacity will be taken care of for five years is meeting with a mixed reception in Missouri. It raises a question of business ethics that is likely to start considerable discussion in the cement industry, and can well be started in all rock products industries. But in Missouri, where the State Highway Commission jumped at the offer it seems to be raising considerable of a political issue.

The Proposition

The best exposition of the Great Western Portland Cement Co.'s proposition we have seen is contained in a letter to the St. Louis *Star*, signed H.P.R., and published in its October 18 issue. It reads as follows:

Editor The St. Louis Star: I am setting out in writing the Volker proposal accepted by the State Highway Commission. The Great Western Portland Cement Co., of which William Volker owns 92 per cent—the rest being owned by members of his family—made a regular bid for furnishing cement to the State Highway Commission to the amount of 296,000 bbl. of 1924, indicating the counties to which it could be profitably sent, in view of freight rates. It was somewhat lower in most counties than other bidders.

Mr. Volker, to whom cement is but a side line, he being one of the chief furniture makers in America and one of the heaviest realty owners in Kansas City, offered to let the bid stand and to remit to the state treasurer, to the road fund, all the dividends on 225,000 shares of the company, after deducting 6 per cent. He agreed that the state's portion of the product should not pay for over 6 per cent interest on bonds or borrowed money. No charge for salaries for president, secretary and treasurer is to be made to the state.

The $225,000 of stock, one-fourth of the whole stock, is placed with a trust company, designated by the State Highway Commission, as trustee, with the legal agreement attached. He has personally offered to extend the contract to cover 400,000 bbl. a year, if required, and to reduce the contract, should the State Highway Commission be unable to use 296,000 bbl. He guarantees that the company will bid each year for five years and that his remission of profits will stand. A contract binding his heirs, assigns and successors is being made.

The plant, which is considered worth $2,000,000, is carried at $1,650,000, of which $900,000 represents stock and $750,000 bonds. It was rebuilt last year and in its kilns, and its bins, both for product and clinkers, is equal to any. The cement, as tests and records show, is of superior quality. The storage capacity permits continuous operation, regardless of weather. The only need of shutting down is for relining of kilns. The supply is inexhaustible. Some of the cement was used in the Kansas City Star building when it became necessary to remove a wall to set it back, it required the use of dynamite to tear down the wall.

Mr. Volker is one of the leading philanthropists of the Middle West. He has been eager to have a part in building the highway system for Missouri.

The only financial gain lies in the ability to make the other three-fourths capacity of his plant —or two-thirds if the state requires 400,000 bbl. a year at a lower cost. But the state will likewise share in the lower cost for its part. Regular audits of the cement company's books will be made by the state. Mr. Gary estimates that the gift of Mr. Volker will amount to 40 cents a bbl., or $800,000 in five years, should the state take the maximum he has offered. It will be $592,000 for the minimum.

The chief engineer, the state geologist, the engineer of material tests and the consulting accountant of the State Highway Commission personally visited the plant and made a thorough examination prior to the acceptance of Mr. Volker's offer.

Furthermore, all materials for use in construction of Missouri highways are examined at the source of supply and again inspected on the project. H. P. R.

Another angle to the controversy comes in the form of an Associated Press dispatch to the Springfield (Mo.) *Republican* from Joplin, Mo., which reads:

Action of a committee of the State Highway Commission in accepting a proposal of the Great Western Portland Cement Co. of Kansas City to furnish cement for Missouri road building was vigorously protested at a massmeeting at Oronogo last night, it became known today.

In a resolution adopted at the meeting, sent to Governor Hyde, the citizens said, "We desire to have the attorney general investigate this matter, not desiring to hamper the highway commission by getting out an injunction against the award."

The resolution sets forth "that the action of the State Highway Commission in rejecting all bids for furnishing cement and the rejection of bids for the building of a cement plant was within their power, but letting a contract along entirely new lines to one William Volker, without first advertising on the basis of Mr. Volker's offer, was not according to law, and the State Highway Commission exceeded its authority in awarding such a contract."

The citizens in the resolutions also pointed out that at the time of the $60,000,000 bond election, it was specified that all road materials would be from within the state, and that under the Volker offer, "expenditures to a large portion of the labor would be from without the state and the taxes and benefits derived therefrom will not accrue the state of Missouri."

It was also contended at the meeting that the Volker plan was not advertised in a state publication for two weeks, so other cement firms of Missouri could enter competitive bids, as required by state law.

The Webb City Chamber of Commerce at a meeting this week also entered a formal protest to awarding the contract to the Great Western Portland Cement Co.

How the controversy will come out remains to be seen. In the meantime business men will continue to speculate on the possibility of doing business on a business-like basis with any public institution.

A Prosperous Rock Products Industry

PAUL B. HAMMOND, executive vice-president of the Pacific Bond and Share Co., which recently completed the sale of $400,000 first preferred stock of the Celite Products Co., has been advised that the earnings of the company for the calendar year 1923 will exceed $300,000 after taxes, depletion, depreciation, etc. This is equal to ten times the annual 7½ per cent dividend requirements. The Celite Products Co., which produces high temperature insulation and other products, announces the opening of a branch office in London.—*Los Angeles Times.*

The Celite Products Co., whose home office is at Los Angeles, Calif., is one of the best examples of enterprise the rock products industry can show. Starting with a deposit of a mineral (diatomaceous earth) hitherto put to little use, this concern, after a long persistent struggle has, by thorough-going scientific research, developed a world-wide demand for what is fast coming to be considered an absolute necessity in many industrial operations.

Iowa Demands Pay for Gravel Taken from the Streams

AFTER holding several conferences with representatives of Iowa sand and gravel concerns on the tax to be paid for these materials taken from Iowa streams and failing to reach an agreement the board has decided on drastic action.

"Unless," declares the board in a resolution just adopted, "proper agreement is made for the leasing of the property in question," the attorney general will be instructed to enjoin concerns or individuals from taking sand and gravel which is the property of the state.

The board believes that 3 cents per ton should be paid for these materials. The sand and gravel men claim they cannot pay this and carry out existing contracts.

The law requiring payment to the state for sand and gravel taken from the streams was passed by the last legislature and its administration was placed in the hands of the board of conservation. Thus far the board has failed to collect this money.—*Davenport, Iowa, Times.*

Foresees Building Activity in 1924

FRANKLIN D. ROOSEVELT, New York, president of the American Construction Council, recently advised curtailment of building activities for 1924, in order to avert another crisis next spring. Unless emergency steps to this end are taken now, he declared, the industry will suffer again from shortage of labor and materials and from the resultant delays in building projects. It was further recommended that smaller contracts be started in the fall and that repair work be done in winter.

Canadian News of Rock Products Industries

THE Granite Concrete Block Co. Ltd., Weston road, Toronto, Ont., Canada, of which P. Livingstone is manager, was started in 1915 with a capacity for 74,000 blocks. The plant has been steadily enlarged, and the first six months of this year the output was 380,000 blocks. The concrete is poured into molds which are then transferred to kilns where they are treated to live steam for 12 hr. No waterproofing is used in the manufacture of the blocks. The face of the block is made of genuine granite crystals.

A. W. Campbell, Dominion Commissioner of Highways has issued a comparative statement of hard surfaced roads in the various provinces. The figures are as follows: Ontario, 33,748 miles; British Columbia, 4223 miles; New Brunswick, 3569 miles; Quebec, 4353 miles; Nova Scotia, 1158 miles; Manitoba, 1625 miles; Prince Edward Island, 9 miles; Saskatchewan, 10 miles, and Alberta, nil.

The possibility of establishing grinding plants in Canada to produce the many varieties of finely ground non-metallic minerals used in Canadian industries is the subject of a comprehensive report prepared in the Mining, Metallurgical, and Chemical Branch of the Dominion Bureau of Statistics. Heretofore, though extensive deposits of the crude material are known to exist in Canada and though these deposits are in certain cases being worked, the bulk of the supply has been derived from importations. It has been suggested that it is feasible to substitute Canadian products for certain of these importations, and it is the purpose of the report now described to present the data required for computing the probable extent of the substitute market which might thus be developed.

With the exception of sulphur in the native state, whiting, and some special grades of clay, Canada possesses important deposits of almost all the non-metallic most commonly used in industries. The minerals now being consumed in Canada in the ground or prepared form are: Actinolite, barytes, calcite, whiting, dolomite, corundum, feldspar, fluorspar, gypsum, lime, magnesite and magnesia, mica, iron oxides, quartz or silica, including silex and flint, tripolite, and talc. Of these, gypsum and magnesite are produced in considerable tonnages, are calcined and otherwise prepared in Canada and supplied in the ground form and larger sizes to consumers both in Canada and abroad. Talc is ground and produced in several marketable grades which are shipped to consumers throughout Ontario and Quebec as well as the United States. Lime is mainly used as crude quicklime in the building trades, pulp manufacturing, sugar and glass-making industries and a limited amount is used as lime-flour. Actinolite, quartz, feldspar and mica are now being prepared to a limited extent in Canada.

A cement industry is to be established at Popcum about 10 miles from Chilliwack, British Columbia, by the Mainland Portland Cement Co., of Vancouver, B. C. This company has secured the Hart & Damask property which is rich in marl, and it is reported that work on a modern plant, representing an investment of about $1,000,000, will commence shortly.

Operations have been resumed by the International Gypsum Corp. at the Bellemarche quarry in Inverness county, Cape Breton, Nova Scotia. The quarry is 3½ miles by railway from the shipping pier at Eastern Harbor. There are several beds available, and the ore being worked has a face 70 ft. high composed of gypsum of very good grade. The property is equipped with mill for calcining the raw gypsum as required. The chief market is in the United States. Formerly a large part of the company's product was shipped to Montreal and Quebec.

R. De Montigny, manufacturer of concrete blocks, Montreal, has been registered.

Asbestos rock mined in Canada during 1922 amounted to 2,562,933 tons. Of this, 2,166,385 tons or 84.5 per cent was milled and 158,023 tons of asbestos was recovered in a marketable state. The sales for the year amounted to 163,706 tons for which the producers received $5,552,723 or an average of $33.92 per ton. During the previous year, the average value per ton was $52.89.

The amount of asbestos sold in 1922 was 78 per cent higher than that sold in 1921 when only 92,761 tons were marketed. During the year, the Quebec government reduced the royalty from 5 per cent of the gross value of asbestos shipped to 2½ per cent, as a measure of assistance to the industry. The entire Canadian production was derived from the eastern townships of Quebec.

OUTPUT, SALES AND STOCKS OF ASBESTOS IN CANADA, 1922

Classification	Total output tons	Sold or Shipped: Quantity tons	Sold or Shipped: Total sales value at mill	Sold or Shipped: Average value per ton	Quantity in stocks on hand at end of period tons
Crude No. 1	759	433	$ 277,492	$640.85	1,163
Crude No. 2	2,190	1,351	447,845	331.49	2,702
Fiberized crude	120	328	64,506	195.56	399
Spinning stocks	11,030	6,739	1,326,920	196.90	10,860
Shingle stocks	18,587	19,647	1,085,174	55.23	10,568
Mill board stocks	3,930	4,386	128,164	29.22	1,360
Paper stocks	43,196	44,135	1,426,533	32.32	9,778
Paper fillers	35,257	43,275	565,671	13.07	3,259
By-products (asbestos sand, finish, floats)	42,954	43,412	230,418	5.31	3,391
Totals	158,023	163,706	$5,552,723	$ 33.92	43,480

New Consulting Expert for Rock Products Industry

CHARLES P. TOLMAN has resigned as chief engineer and chairman of the manufacturing committee of the National Lead Co., which position he has held for the last 16 years. He will continue as consulting engineer for this company, but hereafter will be able to devote a large share of his time to private practice. He is specializing in dust and fume control, material handling, manufacturing methods and processes. His office is at 111 Broadway, New York City.

Meeting of Advisory Board of Highway Research

THE third annual meeting of the Advisory Board on Highway Research of the National Research Council will be held at the headquarters of the council in Washington, D. C. on November 8 and 9, 1923. The status of research in the various fields of highway engineering and highway transport will be evaluated as a basis for further research in this vital element of highway transportation.

W. K. HATT, Director.

Ohio Gravel Ballast Co. Will Build New Plant

THE Ohio Gravel Ballast Co., which is one of the largest sand and gravel producers in the United States, announces that it is to build a new plant at Trenton, Ohio to replace an old plant which has become antiquated.

The old plant was steam driven but the new plant will be operated by electricity.

The same company is replacing a steam shovel by a dragline at Miamiville, Ohio, in order to obtain material below water level.

Slate Convention in New York City, January 21 to 23

THE slate men are coming over 300 strong to the third annual gathering of quarry owners, managers, superintendents, executives and slate dealers, jobbers, roofing and other slate contractors, to be held at the Hotel Commodore, New York City, January 21, 22 and 23, 1924, under the auspices of the National Slate Association. Besides general sessions on common problems, there will be special meetings of each respective branch of the industry to discuss and adopt ways and means to secure relief on vital problems. An opportunity for everyone attending to exchange experiences and methods on common questions. An idea gained may repay the trip several times over.

A program of business and pleasure is being arranged, according to W. S. Hays, secretary of the association, 757 Drexel building, Philadelphia, Pa.

Coal and Rock Products

EDITOR ROCK PRODUCTS: In your issue of October 6, I have been greatly interested in reading the editorial entitled "Coal and Rock Products." I observe that it states that "As we understand the position of the industries this paper represents, they ask no special favors; they only want coal put on the same basis as other industries. If this were done, and the public were given to understand that coal shipments were to receive no priority, it might go far toward curtailing one evil of the coal business, which is to wait until the season is far advanced before buying coal. . . ."

I presume that this refers to the efforts of the National Sand and Gravel Association to secure a modification of the demurrage rules so as to place coal mines on the same basis as sand and gravel plants with respect to the assessment of demurrage penalties. If this is true, may I suggest that priority of coal shipments is not involved in the case. In fact, instead of the coal buying public deriving any advantage from the present demurrage system, it really works to their disadvantage because the coal operators are now enabled, by virtue of demurrage exemption, to use open-top equipment of the carriers as storage facilities and thus for speculative purposes. Coal is loaded into the cars and held unbilled to await rising markets.—T. R. BARROWS, Executive Secretary, National Sand and Gravel Association.

Michigan's State Cement Plant

IT will cost the state of Michigan upwards of $2,000,000 to install its own cement plant, having an annual capacity of 500,000 bbl., according to perliminary figures now in the hands of Governor Groesbeck.

If the governor decided to go ahead with a cement mill when all figures are in, it will be built and conducted as one of the industries of the Michigan prison system, and while the governor could go ahead and built such a mill without legislation, such action is not likely.

Both Governor Groesbeck and members of the State Prison Commission feel that the expenditure of so large an amount on a cement mill should be submitted to the legislature, although such a step would not be necessary. These officials, however, believe the legislature should have an opportunity of expressing itself on the subject, and if it is decided to construct a mill, the subject will possibly be included in the call for the reapportionment session in November.

The state is getting plans on a mill of 500,000 bbl. capacity, which is about the maximum capacity for a single mill. It is estimated that such a mill would furnish about one-fourth of the annual requirement of the state, and by producing an additional 500,000 bbl. in the state a year, it would be a big aid in relieving the annual cement shortage.—*Jackson (Mich.) Citizen-Patriot.*

Gravel Firms Face Stiff State Levy

GRAVEL firms obtaining their stocks from beds of streams in Iowa face a critical situation, according to an authority.

The state board of conservation for which no state funds are available has been empowered to levy a tax on each ton of gravel taken from the beds of "navigable" rivers. Many of the gravel firms have plants operating near Des Moines and will, under the ruling, be subject to this royalty payment.

Owing to some firms owning their gravel beds it will place the others in a position where they will be unable to compete with the former if a tax of any consequence is levied.

In an effort to determine a basis of charge a meeting was held this week by gravel representatives with W. E. G. Saunders, Emmetsburg, and Clifford Niles, Anamosa, members of the board.

Whether it will be profitable for the board to go to the expense of hiring inspectors and buying necessary equipment to measure the gravel effected, will not be determined until later.

A regular meeting of the board is scheduled for October 12.—*Des Moines (Ia.) Tribune.*

Company Is Organized to Mine Asphalt Beds of Pike County, Ark.

THE National Asphalt and Construction Co. has been organized with headquarters in Texarkana, being capitalized at $1,000,000. The officers of the new organization are E. M. Gleason, president; J. F. Ritchie, vice-president, and W. H. Chumley, secretary-treasurer.

(A description of the Uvalde deposit is to be found elsewhere in this issue.—Ed.)

This company controls 4000 acres of rock asphalt deposit in Pike county, Ark., near Delight, said to contain better than one billion tons of rock asphalt.

The company has been offered a fancy price for its holdings by a New York concern, but it unwilling to turn loose, and is now negotiating with a Japanese concern for the sale of 300,000 tons of this product.

Tests are being made of the product for road building purposes and engineering problems in connection with the working of the mine worked out, after which the product will be placed on the market.

It is not unlikely that a road construction company may follow. This product is taken from the mine and placed on the roads in its raw or crude state, then rolled, which gives a surface something like that of hard rubber, and is said to have a resistance, or endurance, better than that of most any other road surfacing material.

There is a similar proposition at Uvalde, Texas, known as the Uvalde Rock Asphalt Co., which has been in operation for some time, and which is said to have enriched its owners.—*Texarkana (Ark.) Texarkanian.*

Arkansas' First Hydrating Plant

THE first white lime hydrating plant in Arkansas is being installed by the Ozark White Lime Co. near Johnson's. Extensive improvements at the plant where lime and cement are produced are nearing completion. The installation of the hydrating plant will give Arkansas a new industry, a recapitalization of $100,000 and a yearly capacity of 100,000 bbl. of white lime. Among the improvements at the new plant at Johnson's is a crusher for grinding down the burnt limestone, a separator, a 5-ft. fan, or blower, two 80-ton storage bins, a patent bagging machine, three 40-ft. elevators and a 50-ft. dust stack. About 45 men will be employed. The Ozark White Lime Co. is 30 years old and has grown steadily.—*Little Rock (Ark.) Gazette.*

A Socialistic Stone Quarry for Milwaukee

THAT the municipal stone quarry idea, originated by Ald. A. W. Strehlow, Socialist, during the administration of Emil Seidel, first Socialist mayor of Milwaukee, is being developed, was disclosed before the common council finance committee.

Without a dissenting vote the committee recommended approval of the request of Public Works Commissioner R. F. Stoelting for $9000, with which to purchase equipment, which he declared is needed to place the quarry in a position to produce the increasing amount of crushed stone required for street construction.

The quarry, formerly known as the Zimmerman quarry, is located on the Lisbon road and is the property of the county, which has given the city permission to operate it. The quarry was purchesed during the Seidel administration on a land contract. The initial payment of $8000 was made.

The administration of Dr. G. A. Bading, first nonpartisan mayor, favored the contractors by abandoning the contract and casting the $8000 payment to the winds.—*Milwaukee Leader.*

Waller Crow, Inc., and Deavitt Laboratories Associated

WALLER CROW, Inc., formerly of 327 South La Salle street, Chicago, has become associated with the Deavitt Laboratories, 209 South La Salle street, Chicago. Both concerns will remain entirely distinct and independent in a corporate sense, but the engineering and chemical practice of the two dove-tail together so closely that much benefit to the industry should result from their working agreement. The Deavitt Laboratories have long done a great deal of Mr. Crow's chemical work. He will specialize on consultations and engineering reports in the rock products industry.

Oregon Rock Products Industry Growing

WITH completion during the next month of Sun Portland Cement Co.'s big plant at Lime, near Huntington, Ore., a new rock products industry of importance will have been added to the eastern Oregon list. Work on the project was started last March and the construction is being rushed night and day to completion. Capacity of the plant will be 1200 bbl. of cement each 24 hr., and upwards of 150 men will be employed in the mill and the quarry, which is located above the plant and connected therewith by an aerial tramway. There is one 10x210-ft. kiln. The wet process is used. The enterprise is most conveniently situated with reard to transportation, as loading of the shipping product will be done into O.-W. R. & N. cars, the main line traversing the plant site.

The Sun Portland Cement Co. is composed almost exclusively of experienced cement manufacturers. H. A. Ross, for many years secretary of the Vancouver Portland Cement Co., Vancouver, B. C., is president; G. MacDonald, formerly of the Vancouver Portland Cement Co., and for the past eight years secretary of the Oregon Portland Cement Co., Portland, Ore., is vice-president, treasurer and general manager; C. T. W. Hollister, formerly with the Colorado Portland Cement Co., Denver, and more recently with the Oregon Portland Cement Co., is secretary and sales manager, and H. L. Knappenberger, former chemist of the Atlas Portland Cement Co. at Allentown, Pa., and more recently with the Vancouver Portland Cement Co., is plant manager.

New Gypsum Plant

Important developments have transpired in connection with an old gypsum mill below Huntington, where the plant and quarry of the Acme Plaster Co. has been acquired recently by the Certain-teed Products Co., an Eastern concern, with national scope and selling organization.

The product of this enterprise is gypsum, used chiefly as a plaster, a retarder in cement manufacture and in the manufacture of a fireproof building block used in building construction. The manufacturing plant is at Gypsum on the Snake river branch of the O.-W. R. & N. company. The crude rock, as it comes from the mine, is given the required treatment and the finished product loaded directly onto the cars for shipment.

The mine, which is located near the summit of the ridge separating Snake and Burnt River valleys, and at an altitude of about 2500 ft. above the Snake, has been worked almost continuously for some 18 years. It is somewhat in the nature of a quarrying proposition, much of the early mining being done by surface stripping. This has been followed by a deeper penetration into the bed of gypsum, resulting in a series of huge caverns underground, with broad pillars supporting the roof. No timber has been found necessary save for warding off falls of rock or other loose material near the entrances, which are quite large. A rough sorting of the mined material is made underground by electric light, the waste going to the dumps and the other broken rock shot down the tramway to the mill.

The Certain-teed Products Co. is continuing output at the former scale, but plans are being laid for an expansion of operation early next year, with construction of new camps and placing of mine operation on a broader basis. The deposit which is being mined is quite extensive, with occasional outcrops of it extending up and down and on the Idaho and Oregon sides of the Snake river for a number of miles.

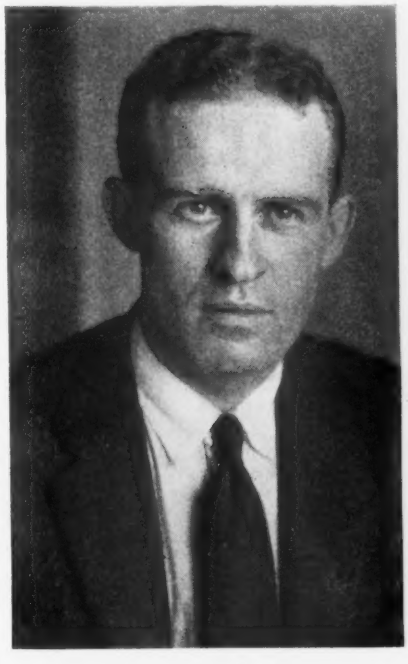
This company also owns and operates a lime plant at the quarry and is contemplating the erection of a hydrating plant.

Burton A. Ford Made Secretary National Lime Association

THE editors have received with genuine satisfaction the following official announcement of the National Lime Association:

"It is with pleasure that we announce the selection of Burton A. Ford as secretary and general manager of the National Lime Association. This action was taken at a regular meeting of the board of directors, held in Chicago on October 11, 1923.

"For the past three months Mr. Ford has been acting secretary of the association, having been appointed to this position at the annual convention held last June. He is a graduate of the University of Maryland, and until the summer of 1922 was with the Virginia-Carolina Chemical Co. in the capacity of division manager, and was also secretary-treasurer of the Bryant Fertilizer Co. In the summer of 1922 he became assistant to W. R. Phillips, who was then general manager of the National Lime Association, so he is thereby well qualified to handle his present position."



Burton A. Ford

Motion Picture of Cement Making

MOTION picture photographers on Thursday shot the last scenes of the film, "The Story of Portland Cement," at the plant of the Sandusky Portland Cement Co. at Silicia. They returned to Chicago on Thursday night.

The film is one of a series of industrial pictures and is being made by the Portland Cement Association upon request of the Bureau of Mines of the Department of Commerce. W. H. Strafford of Chicago was the cameraman.

Some of the pictures were made under extremely difficult conditions, owing to intense heat of the kilns. The brilliancy of the lights also handicapped the photographer, who found it necessary to import lighting fixtures capable of throwing beams of 2,000,000 candlepower into the dust.—*Toledo (Ohio) News-Bee.*

Reduces Working Force but Not Output

SIXTY men were laid off by the American Lime and Stone Co. recently and notice given that effective October 1 all wages would be reduced approximately 10 per cent. Other men are being laid off this week and the reduction in the working force will continue until the services of 150 men have been dispensed with. The lay-off is not a temporary move but a permanent reduction.

Some time ago the Pike quarries and kilns were closed, and later operations ceased at the Green plant up Buffalo Run valley. On Saturday plant No. 26 was closed down and other plants to be closed are Nos. 22 and and 23 and the Keystone, as well as the crusher at No. 25. The closing of these plants will naturally reduce the force of workmen about 150, but contrary to the impression gained by the public it will not curtail the output of either lime or stone by the company.

The big plant on the meadow is now in shape to turn out more crushed stone, lime and hydrated lime, than were produced at all the other plants combined, and at a greatly decreased cost. It is this fact which resulted in the lay off of so so many men, and the reduction of wages has been made to stabilize the cost of production.—*Bellefonte (Pa.) Times.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.40	1.40	1.30	1.10	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Prospect, N. Y.	.80	1.40	1.30	1.25	1.25	.....
Walford, Pa.	1.55	1.55	1.55	1.55	1.55	1.55
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.75	.....	1.75	1.35	.....	.....
Bloomville, Middlepoint, Dunkirk, Bellevue, Ohio	1.00	1.10	1.10	1.00	1.00	1.00
Cypress, Ill.	1.25	1.25	1.25	1.25	1.25	1.25
Chicago, Ill.	.80	1.40	1.10	1.10	1.10	1.10
Dundas, Ont.	.90	1.35	1.35	1.25	1.10	1.10
Greencastle, Ind.	1.25	1.15	1.05	.95	.95	.95
Krause, Columbia and Valmeyer, Ill.	1.20	1.20	1.35	1.35	1.20	1.20
Lannon, Wis.	.75	1.00	1.00	.90	.90	.90
Linwood, Iowa	.80	.....	1.35	1.15	1.25	1.25
Mitchell, Ind.	1.00	.....	.....	.....	.....	.....
Montrose, Iowa	.....	1.50	1.60	1.55	1.45	1.40
St. Vincent de Paul, P. Q.	.85	1.20	1.10	1.00	.95	.95
Sheboygan, Wis.	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10
Southern Illinois	1.35	1.35	1.35	1.35	1.35	1.00
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.35	1.35	1.35	1.35
Stone City, Ia.	.75	.....	1.50†	1.40	1.30	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25‡	2.25‡	2.25‡	2.00	2.00
Waukesha, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	.....
Bridgeport, Texas	1.10	1.40	1.35	1.35	1.25	1.25
Cartersville, Ga.	.....	1.50	1.50	1.00	1.00	1.00
Chickamauga, Tenn.	1.00@1.25	.85@1.25	.....	.85@1.00	.85@1.00	.....
El Paso, Texas	1.00	1.00	1.00	1.00	1.00	.....
Ft. Springs, W. Va.	.60	1.70	1.70	1.50	1.40	.....
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Graysville, Ga.	1.00@1.25	.85@1.25	.....	.85@1.00	.85@1.00	.....
Ladds, Ga.	.....	.....	1.40	1.40	1.40	.....
Morris Spur (near Ft. Worth), Tex.	1.10	1.35	1.30	1.25	1.25	1.20
WESTERN:						
Atchison, Kans.	.50	2.10	2.10	2.10	2.10	1.60‖@2.10
Blue Spr'gs and Wymore, Neb.	.20	1.45	1.40	1.35	1.25	1.20
Cape Girardeau, Mo.	1.35*	1.35*	1.35*	1.35*	1.10*	.....
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.50	1.35	1.15	1.00	.....
Dresser Jct., Wis.	1.00	2.25	.....	1.75	2.00	.....
Duluth, Minn.	1.00	2.25	2.00	1.50	1.40	.....
E. Summit, N. J.	1.80	2.30	1.90	1.60	1.40	.....
Eastern Massachusetts	.85	1.75	1.75	1.40	1.40	1.40
Eastern New York	.75	1.50	1.50	1.30	1.40	1.30
Eastern Pennsylvania	1.25	1.55	1.50	1.40	1.40	1.40
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50@2.00	1.35@1.50	1.15@1.25	1.00@1.10	.....
Oakland, Calif.	1.75*	1.75*	1.75*	1.75*	1.75*	1.75*
Richmond, Calif.	.75*	.....	1.50*	1.50*	1.50*	.....
San Diego, Calif.	1.80	1.80	1.50@1.80	1.25@1.55	1.25@1.55	1.10@1.35
Spring Valley, Calif.	.70	1.55	1.50	1.40	1.35	1.35
Springfield, N. J.	1.80	2.30	1.90	1.60	1.40	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga.—Granite	1.47	2.07	2.07	1.97	1.97	.....
Buffalo, N. Y.—Granite	.90	.....	1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.—Granite	.50	2.25	2.25	2.00	2.00	2.00
Eastern Penna.—Sandstone	.85	1.60	1.55	1.35	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	1.75	1.75	1.25	1.25	.....
Los Angeles, Calif.	2.00	2.00	1.85	1.75	1.65	.....
Middlebrook, Mo.—Granite	3.00@4.50	.....	2.00@3.00	2.00@2.25	.....	1.50@2.20
Sioux Falls, S. D.—Granite	1.00	1.60	1.55	.....	1.50	.....

*Cubic yd. †1 in. and less; ‡prices include 90c freight; ‖rip rap, 1.60 per ton.

Agricultural Limestone

(Pulverized)

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.00; bulk 2.50

Grove City, Pa. — Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$; 60% thru 100 mesh; 45% thru 200 mesh; 100% thru 20 mesh; sacks, 5.00 ..... 3.50

Hillsville, Pa.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, 5.00; bulk 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk 2.50

New Castle, Pa.—94% $CaCO_3$, 1.40% $MgCO_3$—75% thru 100 mesh, 94% thru 50 mesh; sacks, 5.00; bulk 3.50

Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk 3.00

Watertown, N. Y. — Analysis, 96 to 99% $CaCO_3$; .02% $MgCO_3$; 90% thru 100 mesh; bulk, 3.00; sacks 4.50

West Stockbridge, Rockdale, Mass., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

Alton, Ill. — Analysis, 98% $CaCO_3$; 0.5% $MgCO_3$; 90% thru 100 mesh 6.00
50% thru 4 mesh 4.00

Belleville, Ont.—Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 90% thru 100 mesh .. 5.00
90% thru 50 mesh 1.35

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh ..... 1.80@3.80

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 80-lb p. sacks 5.00; bulk 3.50

Piqua, Ohio—100% thru 10 mesh, 2.10; 50% thru 100 mesh, 2.25; 80% thru 100 mesh, 5.00; 100% thru 100 mesh; bags 7.00; bulk 5.50

Waukesha, Wis.—Analysis, neutralizing equivalent 107.38% $CaCO_3$; 99% thru 10 mesh, 55% thru 60 mesh; bulk 2.35
200-mesh bags ex., returnable 4.50

Hot Springs, N. C.—50% thru 100 mesh; sacks, 4.25; bulk 2.70

Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk 2.70

Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200 lb. burlap bag, 4.00; bulk 2.75

Mountville, Va. — Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—50% thru 100 mesh; 100% thru 20 mesh; sacks 5.00

Colton Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk 4.00

Lemon Cove, Calif.—Analysis, 94.8% $CaCO_3$, 0.42% $MgCO_3$; 60% thru 200 mesh; sacks, 5.25; bulk 4.50

Dundas, Ont. — Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$—35% thru 100 mesh; 50% thru 50 mesh; 100% thru 10 mesh; bagged, 4.75; bulk 3.00

Agricultural Limestone

(Crushed)

Bellevue, Ohio — Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh 1.25

Bettendorf, Iowa, and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Buffalo, Iowa—90% thru 4 mesh 1.00

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh 1.50

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$; 90% thru 4 mesh ..... .80

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Elmhurst, Ill.—Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$; 50% thru 50 mesh 1.25

Huntington and Bluffton, Ind.—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; about 20% thru 100 mesh 1.25

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Greencastle, Indiana.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	2.00
Kansas City, Mo.—50% thru 100 mesh	1.25
Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh	1.20
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 83% thru 10 mesh; bulk	1.25
Milltown, Indiana.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 35% thru 50 mesh	1.40@ 1.65
Montrose, Iowa.—90% thru 100 mesh.	1.25
Narlo, Ohio.—Analysis, 56% $CaCO_3$ 43% $MgCO_3$; limestone screenings, 37% thru 100 mesh, 55% thru 50 mesh, 100% thru 4 mesh	1.50@ 2.00
Ohio (different points), 20% thru 100 mesh; bulk	1.25@ 1.50
Piqua, Ohio—100% thru 4 mesh	1.25
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh	1.30
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Toledo, Ohio.—¼ in. to dust, 30% thru 100 mesh	1.50
Waukesha, Wis.—No. 1 kiln dried	2.00
No. 2 Natural	1.75
Alderson, W. Va. — Analysis, 90½ $CaCO_3$; 90% thru 50 mesh	1.75
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$; 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	3.00 / 2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50
Ladds, Ga. — Analysis, 56% $CaCO_3$, 42% $MgCO_3$—all passing 10 mesh	1.50@ 1.75
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCO_3$; 50% thru 50 mesh	.50
Kansas City, Mo., Corrigan Siding—50% thru 100 mesh; bulk	1.80
Tulsa, Okla.—90% thru 4 mesh	.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.	2.25@ 2.50
Cedarville and South Vineland, N. J.—Damp, 1.75; dry	2.25
Cheshire, Mass.—24 mesh, 5.00; 40 mesh, 6.00; 100 mesh	7.00
Columbus, Ohio	1.50@ 1.75
Dunbar, Pa.—Damp	2.50
Falls Creek, Pa.	2.25
Hancock, Md.—Damp, 1.50; dry	2.00
Klondike and Pacific, Mo.	2.00@ 2.50
Mapleton, Pa.	2.25@ 2.50
Mapleton Depot, Pa.	2.50
Massillon, Ohio	3.00
Michigan City, Ind.	.50
Millville, N. J.	2.00
Mineral Ridge, Ohio	2.50
Montoursville, Pa. (green)	2.00
Oregon, Ill.	2.50
Ottawa, Ill.	1.50
Pittsburgh, Pa.—Dry, 4.00; damp	3.00
Ridgway, Pa.	2.50
Rockwood, Mich.	2.50@ 2.75
Round Top, Md.	2.25
Sands, Pa.	2.50
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	2.50@ 3.00
St. Mary's, Pa.	2.25
Thayers, Pa.	2.00@ 2.50
Utica, Ill.	1.25@ 1.50
Zanesville, Ohio	2.00@ 2.50
Foundry Sand:	
Albany, N. Y.—Core	1.60
Molding fine, brass molding	2.50
Molding coarse	2.25
Sand blast	4.00
Allentown, Pa.—Core and molding fine	1.75@ 2.00
Arenzville, Ill.—Molding fine	1.50@ 1.75
Brass molding	1.75
Beach City, Ohio.—Core, washed and screened	2.00@ 2.50
Furnace lining	2.50@ 3.00
Molding fine and coarse	2.25@ 2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00
Cleveland, Ohio.—Molding coarse	1.50@ 2.00
Brass molding	1.50@ 2.00
Molding fine	1.50@ 2.25
Core	1.25@ 1.50

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Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Hts., Pa.	1.25	1.25	.85	.85	.85	.85
Attica, N. Y.	.75	.75	.75	.75	.75	.75
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		.75	.90		1.25	
Farmingdale, N. J.	.48	.48	.65		1.10	
Machias, N. Y.	.75	.75	.85	.85	.85	.85
Pittsburgh, Pa.	1.25	1.25	1.25	.85	.85	.85
Portland, Me.		.50	1.75		1.35	1.35
Washington, D. C.—Rewashed, river	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Anson, Wis.	.35@ .40	.35@ .40				.80@ .85
Barton, Wis.		.40@ .60		.50@ .70	.50@ .70	
Beloit, Wis.		.70			.80	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75	.75@1.00	.75	.75@1.00	.75@1.00	.75
Covington, Ind.	.75	.60	.75	.75	.75	.75
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
Attica, Ind.	.75	.60	.75	.75	.75	.75
Moronts, Ill.	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Oregon, Ill.	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Ottawa, Ill.	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Yorkville, Ill.	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Dresden, Ohio	.70	.60	.60		.90	
Eau Claire, Wis.	.40@ .50	.40	1.00@1.25			.85
Elkhart Lake, Wis.	.60	.60	.70	.70	.70	.70
Grand Rapids, Mich.		.50		.70		.80
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.	.50	.50		.75		.75
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75		.75	.65@ .75	
Mason City, Iowa	.65	.65	1.75	1.70	1.65	1.65
Mankato, Minn.	.40‡	.40	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Moline, Ill.	.60	.60	Concrete gravel, 40% G., 60% S., .90			
Palestine, Ill.	.75	.60	.75	.75	.75	.75
St. Louis, Mo., f.o.b. cars	1.20	1.45	1.65§	1.45	1.65	1.45‖
St. Louis, Mo., deliv. on job	2.05	2.20	2.35	2.15		2.10
Silverwood, Ind.	.75	.60	.75	.75	.75	.75
Summit Grove, Ind.	.75	.60	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	1.00	1.00	.75	.75
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Winona, Minn.	.40	.40	.50	.90@1.00	.90@1.00	.90@1.10
			(.05 ton discount 10 days)			
Zanesville, Ohio		.60	.60	.90	.90	
SOUTHERN:						
Birmingham, Ala.	1.29	1.29	2.79	1.79	1.64	1.54
Brookhaven, Miss.; Roseland, La.	.50@ .75	.25@ .50	1.00@1.50	1.00@1.25	.85@1.00	.85@1.00
Charleston, W. Va.	all sand 1.40 f.o.b. cars		all gravel 1.50 f.o.b. cars			
Estill Springs, Tenn.	1.35	1.35		1.00	.85	.65
Ft. Worth, Texas	2.25	2.25	2.25	2.25	2.25	2.25
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	.75@1.00	1.00	1.20	1.20	1.20	
Lake Weir, Fla.		.50				
Memphis, Tenn.	1.00	1.00	1.80	1.80	1.80	1.80
New Martinsville, W. Va.	1.00	1.00			1.20	.80
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.			Kaw river sand .75 per ton f.o.b. plants			
Los Angeles, Calif.		.85@1.15	1.65	1.65	1.50	1.50
Pueblo, Colo.	1.10*	.90*		1.50*		
San Diego, Calif.†	.50@ .70	.80@1.00	1.30@1.60	1.35@1.65	1.10@1.40	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.25*	1.25*	1.50*	1.25*	1.25	1.25*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine sand, 1/10 in.	Sand, ¼ in.	Gravel, ½ in.	Gravel, 1 in.	Gravel, 1½ in.	Gravel, 2 in.
Atlanta, Ga.	.30@ .40	.30@ .40				
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Brookhaven, Miss.; Roseland, La.					.35@ .50	
Cape Girardeau, Mo.			River sand, .80 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dresden, Ohio					.25	
Dudley, Ky. (crushed sand)	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.		.45				
Estill Springs, Tenn.						.85
Fishers, N. Y.		.60			.55@ .60	
Gainesville, Texas		.95				.55
Grand Rapids, Mich.						.60
Hamilton, Ohio					.70	
Hartford, Conn.		1.00*				
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas	.95					.55
Mankato, Minn.		All sand and gravel .60 per ton. Pit run gravel, .50				
Moline, Ill.	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.						1.55
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas		.80		1.50		1.30
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.			Washed gravel .50 to .60 a ton			
York, Pa.		.95@1.10	(crushed rock sand)			
Zanesville, Ohio		.60	.60			

*Cubic yard. †Low prices, wholesale; high prices, retail; ‡¾ inch down; §⅝ inch and less; ‖2½ inches and less.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Erie, Pa.	Crushed run slag, 4 in. and less, 1.25@1.35						
Emporium, Pa.			1.25	1.25		1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, 1.50, f.o.b. Chicago						
Detroit, Mich.	All sizes, 1.65, f.o.b. Detroit						
Ironton, O.	2.05	1.45	1.80	1.45	1.45	1.45	1.45
Jackson, O.		1.35		1.35	1.35	1.35	1.35
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.50	1.35	1.35	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
Steubenville, Lowellville, Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton and Roanoke, Va.	2.50	.60	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Adams, Mass.			7.00				2.90	
Bellefonte, Pa.		10.50*	10.50*	10.50*	9.00		8.50	1.80
Buffalo, N. Y.				12.00				
Berkeley, R. I.			12.00					2.30
Cassadaga, N. Y.			Agricultural marl 7.00					
Lime Ridge, Pa.							5.00a	
West Rutland, Vt.	13.50	12.00					11.00	3.20
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00				6.00	
York, Pa. (dealers' prices)		11.50	11.50	12.50			9.50	1.85b
CENTRAL:								
Cold Springs, Ohio	12.50	11.00	10.00		9.00	11.00	10.00	
Delaware, Ohio		10.00	9.00	11.00			9.00	1.60
Gibsonburg, Ohio	12.50	11.00	10.00		9.00	11.00	10.00	
Huntington, Ind.	12.50	11.00	10.00		9.00	11.00	10.00	1.60c
Luckey, Ohio	12.50‡	11.00	9.00‡					
Marblehead, Ohio		11.00	10.00				10.00	1.60d
Marion, Ohio		11.00	10.00				10.00	1.80†
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.60
Sheboygan, Wis.							10.00	
Tiffin, Ohio					9.00	11.00		
White Rock, Ohio	12.50				9.00	11.00		
Woodville, O. (dlrs.' price)	12.50‡	11.00‡	10.00‡				10.00	1.60
SOUTHERN:								
Erin, Tenn.							8.50	1.50
El Paso, Texas							10.00	1.50
Karo, Va.							7.00	1.50
Knoxville, Tenn.	12.50	11.00	11.00	11.00	8.50		8.50	1.50
Ocala and Zuber, Fla.	13.00						11.00	1.70
Sherwood, Tenn.	12.50	11.00	11.00	11.00			8.50	1.50
Staunton, Va.					4.50		8.50	1.35
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							12.50	15.00
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.40
Tehachapi, Calif.							13.00	2.10e

*Paper sacks; †180-lb. net, non-returnable metal barrel; ‡50-lb. paper bags, terms 30 days net, 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice; ||80-lb. paper bags; (a) F. O. B. kilns; (b) 180 lbs. net; $2.85, 280 lbs. net; (c) wooden bbls.; (d) wooden, 1.60, steel, 180; e, wooden bbls.; steel bbls., 2.20.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio—Core	.40@	2.00
Molding fine, brass molding	2.00@	2.50
Furnace lining	1.75@	2.50
Sand blast	3.50@	5.50
Stone sawing	1.50@	2.00
Traction	.50@	.75
Molding coarse	1.75@	2.00
Delaware, N. J.—Molding fine		2.00
Molding coarse		1.90
Brass molding		2.15
Dunbar, Pa.—Traction		2.50
Dundee, Ohio.—Glass, core, sand blast traction		**2.50**
Molding fine, brass molding (plus 75c for winter loading)		**2.00**
Molding coarse (plus 75c for winter loading)		**1.75**
Eau Claire, Wis.—Sand blast	3.25@	3.75
Falls Creek, Pa.—Molding, fine and coarse		**1.75**
Sand blast		**2.00**
Traction		**1.75**
Franklin, Pa.—Core		**2.00**
Furnace lining		**2.50**
Molding fine and coarse		**2.00**
Brass molding		**2.00**
Greenville, Ill.—Molding coarse	1.30@	1.60
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled		**.80**
Bank run		**.65**
Kansas City, Mo.—Missouri river core		.80
Kasota, Minn.—Molding fine	1.60@	1.85
Molding coarse, stone sawing	1.45@	1.75
Klondike, Pacific, Gray Summit, Mo.—Molding fine and coarse, stone sawing, roofing sand		2.00
Mapleton Depot, Pa.—Brass molding		2.00
Molding fine		2.00
Roofing sand		2.50
Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse; damp, 2.00; dry		2.75
Massillon, Ohio—Molding fine, coarse, furnace lining and core		3.00
Traction		2.75
Michigan City, Ind.—Core, traction		.50
Millville, N. J. Core		2.00
Mineral Ridge, Ohio.—Core, furnace lining, molding fine and coarse, roofing sand, sand blast, stone sawing (green)		2.00
Traction (green)		1.85
Montoursville, Pa.—Core	1.25@	1.40
Furnace lining		1.20
Traction		1.25
New Lexington, Ohio—Molding fine		2.25
Molding coarse		2.00
Oregon, Ill.—Core	1.50@	2.00
Sand blast		4.00
Stone sawing	2.00@	2.50
Ottawa, Ill.—Core	1.50@	2.50
Furnace lining and traction		1.50
Roofing sand		1.50
Sand blast		4.50
Stone sawing		4.50
Brass molding		2.50
Molding, coarse (crude)	.85@	1.00

Miscellaneous Sands

(Continued)

Ottawa, Minn.—Crude silica sand	.75@	1.00
Ridgway, Pa.—Core		2.00
Furnace lining, molding fine, molding coarse		1.25
Traction		2.25
Rockwood, Mich.—Core	2.00@	2.50
Roofing	2.75@	3.00
Sand blast		3.75
Round Top, Md.—Molding fine		1.60
Traction		1.75
Roofing sand		2.25
San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@	3.50
(Direct from pit)		
Furnace lining, molding coarse, sand blast		3.60
Stone sawing, traction		2.30
St. Louis, Mo.—Red heavy molding	1.50@	2.25
Red fine	1.50@	2.00
Molding fine and brass	2.00@	3.00
Skein core	1.75@	2.25
White core sand	1.00@	1.75
Sand blast	2.00@	4.50
Furnace lining	1.50@	2.50
Roofing sand	1.00@	1.50
Stone sawing	1.25@	2.00
Thayers, Pa.—Core		2.25
Furnace lining, molding fine and coarse		1.25
Traction		2.25
Utica, Ill.—Core, furnace lining, molding coarse	.75@	1.50
Molding fine	.75@	2.25
Roofing sand, traction, brass molding	1.25@	1.50
Sand blast		2.25
Stone sawing	1.25@	2.25
Warwick, Ohio.—Furnace lining, dry 1.75, green		2.00
Molding fine and coarse, dry 2.50; green		1.75
Traction and brass molding		2.50
Core, dry	2.50@	2.75
Core, green		1.75
Zanesville, Ohio—Molding fine, brass molding	1.75@	2.00
Molding coarse		1.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Asheville, N. C.—Best white and 200-mesh (per ton)		8.00
Yellow (per ton)		9.00
Red (per ton)		13.00
Baltimore, Md.—Crude talc (mine run)		3.50
Ground talc (20-50 mesh), bags		10.00
Ground talc (150-200 mesh), bags		12.00
Cubes		60.00
Blanks (per lb.)		.08
Chatsworth, Ga.—Crude talc (grindings)		5.00
Ground talc (150-200 mesh), bags	10.00@	15.00
Pencils and steel workers' crayons, per gross	1.00@	2.50
Chester, Vt.—Crude talc	3.50@	4.00
Ground talc (150-200 mesh), bulk	6.50@	8.50
Including bags	7.50@	9.50
Emeryville, N. Y.—325 mesh		14.75
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags		18.00
Henry, Va.—Crude talc (lump mine run) per 2000-lb. ton	3.00@	3.50
Ground (20-50 mesh), bags	6.50@	8.00
(150-200 mesh), bags	9.75@	12.50
Keeler, Calif., bulk	20.00@	30.00
Los Angeles, Calif.—Crude	15.00@	22.00
Marshall, N. C.—Crude talc		4.50
Ground talc (150-200 mesh), bags	8.00@	12.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@	13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@	10.00
Ground talc (150-200 mesh), bulk	10.00@	22.00
Vermont—Ground talc (20-50 mesh); bags		7.50@10.00
Ground talc (150-200 mesh); bags	8.50@	15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk		5.00
(Bags 1.00 extra)		
Ground talc (150-200 mesh), bulk	8.00@	14.00
(Bags 1.00 extra)		
Pencils and steel workers' crayons, per gross	1.20@	2.00

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%	6.00@	8.50
Gordonsburg, Tenn.—B.P.L. 68-72%	5.50@	6.00
Mt. Pleasant, Tenn.—Analysis, 65% B.P.L. (2000 lb.)	6.00@	6.50
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		7.00
Paris, Idaho.—2000 lb. mine run, B.P.L. 75%	4.50@	5.00
Ottawa, Minn.—All crude silica sand	.75@	1.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$8.40	$8.10	$7.50
24x14	10.20	8.40	8.10	7.50
22x12	10.80	8.70	8.40	7.80
22x11	10.80	8.70	8.40	7.80
20x12	12.60	9.00	8.70	8.10
20x10	12.60	9.00	8.70	8.10
18x10	12.60	9.00	8.70	8.10
18x 9	12.60	9.00	8.70	8.10
16x10	12.60	8.70	8.40	7.80
16x 9	12.60	8.70	8.40	7.80
16x 8	12.60	8.70	8.40	7.80
18x12	12.60	9.00	8.70	8.10
16x12	12.60	8.70	8.40	7.80
14x10	11.10	8.40	8.10	7.50
14x 8	11.10	8.40	8.10	7.50
14x 7 to 12x6	9.30	8.10	7.50	7.50
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. ton	
Barton, Fla.—Analysis, 50-65% B.P.L.	3.50@ 8.00
Centerville, Tenn.—B.P.L., 65%	6.50*
Benotis, Fla.—Analysis 77-82% B.P.L.	8.00
Montpelier, Idaho. — Analysis, 72% B.P.L., crushed and dried	3.75
Mt. Pleasant, Tenn.—B.P.L. 65%	6.50
Twomey, Tenn.—B.P.L. 65%	6.00@ 6.50

*Less $1.00 per ton dealer commission.

Florida Soft Phosphate

(Raw Land Pebble)

	Per Ton
Benotis, Fla.—Analysis 26-28% phosphoric acid—200 lb. sacks, carload lots	10.00
Florida—F. O. B. mines, gross ton, 68/66% B.P.L.	3.25
70% min. B.P.L.	3.55
72% min. B.P.L.	3.85
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

	Per Ton
Jacksonville, Fla., District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65% B.P.L.	5.75

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Slate granules		6.50@ 7.00
Granville, N. Y.—Red slate granules		7.50
Harrisonburg, Va.—Blk. marble (crushed, in bags)		12.50@18.50
Ingomar, Ohio (in bags)		8.00@25.00
Mertztown, Pa. (granite) bags, $10.00; bulk		8.00
Milwaukee, Wis.		14.00@26.00
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsburg, N. J.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Poultney, Vt.—Slate granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.—(2000 lb.)		8.00@20.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags 12½c extra	4.50	4.50

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Carpenterville, N. J.	19.00	31.50@45.00
Easton, Pa.	16.00	40.00@60.00
Eau Claire, Wis.	15.00@20.00	25.00@40.00
Ensley, Ala.	16.00	26.00
Eugene, Ore.	25.00@26.00	50.00@75.00
Friesland, Wis.	22.00	32.00
Houston, Tex.		19.50
Omaha, Neb.	18.00	30.00@40.00
Portland, Ore. (Del'd)	21.00	30.00@60.00
Puyallup, Wash.	20.00	60.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@40.00
Salem, Ore.	25.00	35.00@50.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Springfield, Ill.	18.00	20.00@25.00
Wauwatosa, Wis.	15.00@16.00	28.00@65.00
Watertown, N. Y.	18.00@21.00	35.00@37.00
Winnipeg, Can.	18.00	26.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	11.00
Boston, Mass.	15.00@16.50
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	11.50
Lancaster, N. Y.	14.50
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	14.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Rives Junction, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Texas	13.00
San Antonio, Texas (deliv. city lts.)	13.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	20.00
F.o.b. cars	15.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	23.00	14.50
Baltimore, Md.	24.25	17.85
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	21.00	20.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	.....
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots.

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	3.00
Boston, Mass.	.....	2.68@2.78
Buffalo, N. Y.	.....	2.53
Cedar Rapids, Iowa	.62	2.48
Cincinnati, Ohio	.63½	2.54
Cleveland, Ohio	.61½	2.46
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.49
Dallas, Texas.	.56¼	2.25
Davenport, Iowa	.60¾	2.43
Dayton, Ohio	.....	2.48
Denver, Colo.	.....	2.84
Detroit, Mich.	.62	2.48
Duluth, Minn.	.56¼	2.25
Indianapolis, Ind.	.60¾	2.41
Kansas City, Mo.	.61¼	2.45
Los Angeles, Cal. (less 5c dis.)	.....	3.16
Memphis, Tenn.	.....	2.85
Milwaukee, Wis.	.59¼	2.37
Minneapolis, Minn.	.62½	2.50
Montreal, Canada (sks. 20c ext.)	.....	2.25
New Orleans, La.	.....	2.90
New York, N. Y.	.....	2.30
Philadelphia, Pa.	.....	2.96
Phoenix, Ariz.	.....	3.30
Pittsburgh, Pa.	.56	2.24
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.63*
St. Louis, Mo.	.58¾	2.45
St. Paul, Minn.	.62½	2.50
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Spokane, Wash.	.....	.....
Toledo, Ohio	.62	2.48

†Sack 10c ext.; 10c dis. 10 days.
*Warehouse, 3.15.
NOTE—Add 40c per bbl. for bags.

Mill prices f. o. b. in Carload Lots to Contractors	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Cincinnati, Ohio	.....	3.00†
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.15
Dayton, Ohio	.....	2.85†
El Paso, Tex.	.....	3.20*
Hannibal, Mo.	.....	2.10
Hudson, N. Y.	.....	2.20
Indianapolis, Ind.	.....	2.96†
Leeds, Ala.	.....	2.20
Los Angeles, Calif.	.....	2.80
Louisville, Ky.	.....	2.52
Memphis, Tenn.	.....	3.24†
Northampton, Pa.	.....	2.10
Phoenix, Ariz.	.....	4.30‡
Steelton, Minn.	.51½	2.06
Universal, Pa.	.50	2.00

†Including cloth sacks.
*Gross, 10c sacks and 10c per bbl. disc 10 days.
‡Gross, 15c sacks and 5c per bbl. disc. 10 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	—Plaster Board— ⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard. ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	6.00	6.00	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	.....	5.00	10.00	10.00	10.00	.....	.....	31.00	.....	19.75	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	11.00	11.50	.....	.....	33.75	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	16.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton

New Machinery and Equipment

Dry Grinding with Rods with the Marcy Mill

THE development of the Marcy rod mill was started in 1917. Two years later the first one, a 6x12-ft., was sold to the Phelps-Dodge Corporation. This mill proved so satisfactory that the company re-ordered repeatedly, until now there are 36 Marcy rod mills installed in its various plants in Arizona, New Mexico and Mexico. The fame of this improved mill spread rapidly. At the present time the use of the Marcy rod mill is world-wide.

Close-up of dry grinding Marcy Rod Mill

This mill is built on scientific engineering principles with particular regard for strength and durability. According to information furnished by its manufacturers it will carry an exceedingly heavy rod charge; the rod charge of the 7x15-ft. mill is 24 to 25 tons. The tendency toward vibration is necessarily very great where such a large charge of rods is in constant motion. The exceptionally high grinding efficiency of the Marcy is claimed to be partly due to the fact that its construction eliminates vibration. It is built in eight standard sizes, having capacities from 20 to 1500 tons per 24 hr.

It is universally recognized that, to derive maximum efficiency in grinding with rods, three factors are of prime importance:

1. A heavy, slowly revolving rod mass;
2. A low pulp line—that is, a small amount of pulp in the mill;
3. A simple and practical method for removing broken rods, rods worn as small as ⅝-in., and for repairing the interior of the mill barrel.

The Marcy is said to be designed to provide just such operating conditions.

When the material in a mill has been reduced to the required fineness it should be discharged at once, otherwise it acts as a cushion between the rod mass and the unfinished material in the mill. In the Marcy rod mill this is accomplished by the low pulp line or, in other words, by the wide discharge opening. Where the discharge opening of a mill is small, the bed of material in the mill is necessarily very deep, as the point of overflow is high. In that type of mill it is difficult for material which has been ground to size to escape; at all times there is a large percentage of fines in the mill which decrease the grinding efficiency very materially and at the same time increase the power consumption. In the Marcy such conditions are not possible, as the low pulp line induces the removal of finished material as rapidly as it has been ground to the required mesh. The rods work on thin layers of unground material. Maximum grinding efficiency is thus obtained, the necessary horse power is reduced to a minimum, and the cost per ton of ground product is claimed to be surprisingly low. Some idea of the high efficiency of the low pulp line can be gathered from the following test (reported by the manufacturers):

"Two Marcy mills were set up side by side, each operating under exactly the same conditions. One mill was equipped with the standard Marcy grates and lifters, this mill operating on the low pulp line principle. The grates were removed from the second mill and replaced with solid liners and the lifters were cemented up. These changes transformed this mill into an overflow type mill.

"The mill operating on the low pulp line principle showed 80 per cent more capacity than the mill operating on the overflow principle. The contents of a Marcy Mill change four times as fast as in an overflow type mill."

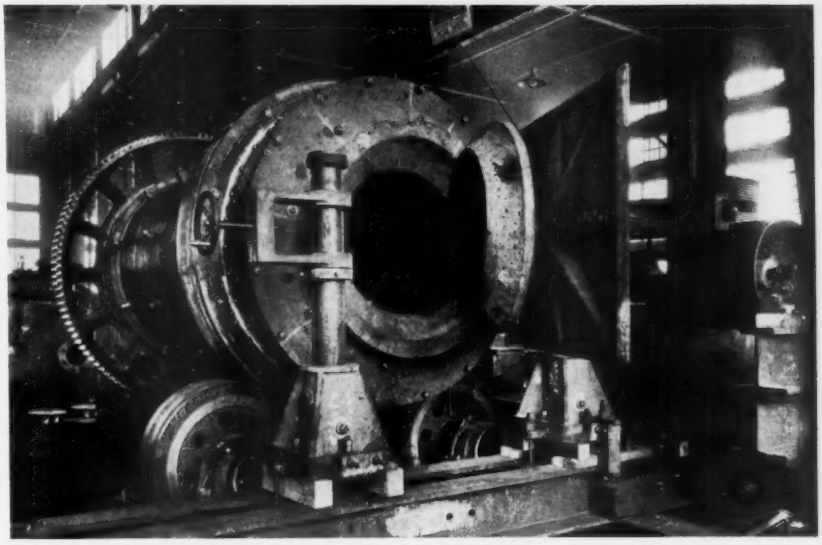
To do efficient grinding with rods it is necessary to keep the rod charge in good condition. High carbon steel rods, which will break rather than bend, are usually used. When a rod is worn down to ⅝-in. it should be removed and new rods added to make up the steel loss. This is quickly and easily done with the Marcy because of the wide discharge opening. To prevent the rods from working out of the mill, and to prevent splashing as well, a heavy door is provided at the discharge end of the mill, but mounted independently. To inspect the interior of the mill, to remove or add rods, or to reline the mill, it is only necessary to swing open the door, as one would open the door of a vault. The door may be opened at any time, even while the mill is running. Because of the ease and simplicity of this operation, the operating time of a Marcy is claimed to average about 99 per cent. Less than 5 min. each 24 hr. is required to adjust the rod load. The time necessary to reline the mill is reduced to a minimum; men and repair parts can enter it without first having to tear it down. Complete re-sorting of the rod load is usually done when the mill is relined.

The line contact in grinding with rods, which creates maximum grinding contact and a minimum of voids, is chiefly responsible for the exceptionally large capacity of the Marcy. A major part of the grinding is done by attrition rather than by impact. When grinding wet in the Marcy the percentage of solids in the pulp is carried very high—usually 70 to 75 per cent, depending on the ore. The pulp should be thick enough to coat the rods but not so thick as to make the pulp

gummy. It is because of the low pulp line feature that such a high percentage of solids can be carried. This is important because of the fact that if the pulp dilution is high the rods will not be coated and but little grinding will be done by attrition. In an overflow type of mill dilution of the pulp must be carried much higher than in the Marcy, with the result that less grinding is done by attrition. In the Marcy the material which is being crushed and rolled between the rods is permitted to flow freely from them through the large open discharge end. This feature minimizes the buoyant effect of the pulp within the mill upon the rod load and the pulp does not float the rods.

The Marcy rod mill is claimed to be a particularly efficient machine for dry grinding. The Marcy low pulp line principle assures the rapid removal of fines as fast as they are formed. In open circuit grinding a uniform granular product of from 8 to 20 mesh is delivered. It will contain a minimum amount of oversize. If finer grinding is desired the mill must be operated in closed circuit with a classifying system. If the grinding is wet, classification of the pulp is usually accomplished by means of a mechanical classifier. If the grinding is dry, and not too fine, the rod mill product is usually sent to a vibrating screen, the oversize being returned to the mill for regrinding. If extremely fine, dry grinding is desired, and the mill must be placed in closed circuit with an air classification system.

The Marcy rod mill is claimed to be particularly efficient in the dry grinding of such materials as limestone, cement clinker, phosphate, gypsum, stone, sand, oil shale, talc, terra cotta materials, grog, coal, coke, carborundum, feldspar and ores.



Open door discharge end

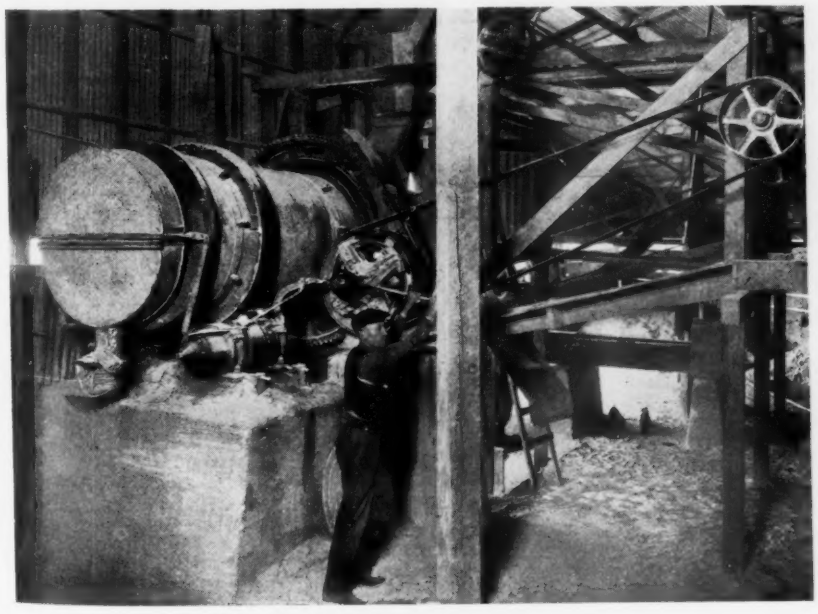
One of the most interesting of the Marcy dry grinding installations is the 3x6-ft. Marcy rod mill in the plant of the Denver Terra Cotta Co., Denver, Colo. A large variety of materials are ground in this mill, including clay, fire clay, calclined clay, grog, shale, hard porphyry, feldspar and felsite. Some of the materials are ground coarse, some medium and some fine, depending upon whether they are to be used for brick, terra cotta work, or modeling clay. The feed varies as to size and moisture content. The size of the feed runs from fines up to 2½-in. ring and the moisture present will vary from bone dry to 18 per cent. Some of the materials are ground to 80 per cent minus 100 mesh.

As an example of the work done by Marcy rod mills, the following screen analysis is given. It was made on the ground product when the mill was fed with felsite, the feed being 2½-in. ring and finer in size. The mill was the 3x6-ft. Marcy referred to in the preceding paragraph:

MARCY MILL DISCHARGE

Mesh	Per cent weight	Cumulative per cent weight
+ 30	1.05	1.05
+ 40	1.40	2.45
+ 50	4.91	7.36
+ 60	3.51	10.87
+ 80	2.81	13.68
+100	7.02	20.70
+150	7.72	28.42
+200	7.72	36.14
—200	64.00	100.14
	100.14	

The Marcy mill is made by the Mine and Smelter Supply Co., Denver, Colo.



Clutch control of rod mill

Concrete Is Ancient Highway Material

THE first known concrete highway was laid down by the Romans in England, between Westchester and London. Excavation uncovered several sections in excellent condition. Apparently the material was a natural cement mixed with pebbles and worked into a roadbed about 12 in. thick.

The art seems to have been lost for nearly 2000 years, the next example being in Edinburgh, Scotland, in 1872, when some concrete pavements, still in use and good condition, were made.

In our own country, Bellefontaine, Ohio, gets credit for being the first municipality to experiment with cement streets, in 1893. But it is really Wayne county, Michigan, the Detroit automobile factory region, which made the concrete highway known to the nation. This early experiment was in 1907. In 1909 less than half a million square yards of concrete were laid (perhaps 50 miles), while in 1921 more than 60,000,000 sq. yd. were laid (more than 7000 miles).

News of All the Industry

Incorporations

Vernon County Asphalt Co. has been incorporated in Nevada, Mo., and will mine and refine asphalt rock near that city. John H. Lohmeyer, president; L. A. Johnson, secretary.

Nel-Stone Co. of Georgia and Alabama has been incorporated in Atlanta, Ga., for $250,000 and will establish a plant to manufacture fabricated stones for building purposes. R. L. Langston is one of the incorporators.

Gomez, Lang, Pena Bros., Inc., Barre, Vt., has been incorporated for $10,000 by Joseph Pena, Barre; Ellis J. Gomez, New York, and Alland Fay of Barre.

Indianapolis-Colitic Stone Co., Wilmington, Del., has been incorporated for $500,000 to mine and quarry stone.

Belvoir Stone and Supply Co., South Euclid, Ohio, has been incorporated for $140,000 by William T. Arnos.

Hub Granite Co. has been incorporated in Marshfield, Wis., for $25,000 by T. Harshner and G. Lehnherr to operate a quarry.

Ceo-Look Concrete Units Corp. has been chartered in Spokane, Wash., for $100,000 by Samuel P. Weaver, Wm. A. Wells and others.

Carolina Lime Co., Charleston, S. C., has been incorporated for $5000 to mine phosphate rock and marl and to dry and prepare them for the market. The company will also manufacture chemical acids and fertilizers. President and treasurer, M. M. Hutchinson; vice-president and secretary, E. H. Hutchinson.

Duralite Co. of Washington, Seattle, Wash., has been incorporated for $100,000 by W. I. Turck, Harry Spaw and R. H. Coshun to deal in duralite, cement, lime and all kinds of plasters and artificial stone.

Riverside Cement and Asbestos Mfg. Co. has been incorporated at Wilmington, Del., for $3,000,000.

Michigan Lime and Fertilizer Co., Jackson, Mich., has been incorporated for $200,000. Henry W. Berger and Charles P. Berger, both of Jackson, are interested.

Cedar Grove Sand and Gravel Co., Union Bldg., Newark, N. J., has been incorporated for $250,000. The company will work both quarries and sand and gravel pits.

Foundry Molding Sand Co., Birmingham, Ala., has been incorporated by H. H. Lind, Frank Marquis and Byrd Tichenor, with an authorized capital of $30,000, fully paid in.

Polk County, Rock, Clay and Sand Co. has been incorporated at Bartow, Fla., for $20,000. M. G. Riche, president; R. C. Hatton, vice-president, and J. A. Waddell, secretary.

Mapleton Limestone Co., Huntingdon, Pa., has been incorporated by W. B., Richard M. and Fred M. Simpson for manufacturing and dealing in crushed stone.

Rauscher Lime Co., Erin, Tenn., has been incorporated for $25,000 by E. W. Rauscher, Jr., W. R. Wyatt, Louise A. Rauscher, John De Witt and R. E. Lee.

Pulver Distributing Co., Wilmington, Del., has been incorporated for $100,000 to manufacture lime. E. L. Mettier, 832 Market street, Wilmington, Del., is agent.

Port Deposit Quarry Co., Port Deposit, Md., has been incorporated for $150,000 by Charles A. Morrison, Port Deposit; B. N. McCullough, Baltimore; James Murphy, Washington, and Messrs. McGinnis and Walsh, Boston.

DeSmet Sand and Gravel Co., Aberdeen, S. D., has been incorporated for $75,000 by A. D. Neer, F. B. Robinson and H. A. Ditmanson.

Daugherty Sand and Gravel Co., Ardmore, Okla., has been incorporated for $25,000 by E. E. Holmes, V. L. Gray, Ardmore, and J. C. Skerl, Wilson, Okla.

Scioto Township Limestone Co., Cove (Jackson county) Ohio, has been incorporated for $10,000 by John W. Stephenson, George W. Weber, C. R. Berton, Roy W. Perry and J. C. Gahm.

Orleans Sand and Gravel Co., Buffalo, N. Y., has been incorporated for $100,000 by R. C. Parsons, E. W. and J. F. Sutton. (Attorney, W. H. Hickey, Buffalo.)

California Quarries Corp., Los Angeles, Calif., has been incorporated for $200,000. Shares, 8000; subscribed, $75.

Schumacher Stone Co., Pandora, Ohio, has been incorporated for $18,000 by Fanny Schumacher, Amos Schumacher, C. C. Hilby, A. S. Brauen, and Elias Schumacher.

Rack Sand and Gravel Co., Cincinnati, Ohio, has been incorporated for $25,000 by John M. Renner.

Iron City Sand and Gravel Co., Pittsburgh, Pa., has been incorporated for $5000 by Ralph D. McKee, 1012 Park Bldg.

Whitehouse Trap Rock Co., New Brunswick, N. J., has been incorporated for $50,000 by Arthur C. Ellison, 267 Somerset street, New Brunswick; Gilbert H. Van Note, 459 High street, Newark, N. J., and Helen C. Barnwell.

Quarries

Hawkeye Quarries Co., Cedar Rapids, Iowa, has closed a contract to furnish 1200 carloads of crushed stone for a paving project in Black Hawk county, Iowa. This is the biggest improved road proposition ever carried in Iowa.

Monmouth Stone Co.'s plant at Gladstone, Ill., is crushing stone for the hard road to be built in Gladstone township in Henderson county and the plant expects to be working for some time on this contract. Resumption of work there gives employment to 25 or 30 men and prospects for a continuance of good business are bright.

Tampa Rock Co., Tampa, Fla., is now operating a crushed rock plant, using the flint rock which is plentiful around that city.

Oliver Co., Hibbing, Minn., contemplates establishment of a crushing plant near Morton road.

American Crushed Rock Co., American Bank Bldg., Los Angeles, Calif., expect to construct a $100,000 plant soon.

Hendrix Bros., Putnamville, Ind., have installed a crusher in the quarry west of Cloverdale and are supplying stone for the town in repair work and for the state in resurfacing parts of the state road No. 32.

George H. Palmer Co., Miami, Fla., is erecting a crushing and screening plant about a mile west of the Musa Isle bridge on the Miami canal. The plant will cost about $10,000 and the engineers are Sanquist & Snow, Calumet Bldg., Miami, Fla.

Sand and Gravel

Mastwood Sand and Gravel Works, Grayville, Ill., have begun operation.

American Rock Co. will start immediate construction of its $100,000 gravel crushing plant at Claremont, Calif.

The State Railroad Commission stands by its judgment in the complaint of excessive rates on sand and gravel from Paducah to Hopkinsville in which it was overruled by the U. S. District Court here for error in taking judicial notice of the rate between Paducah and Cairo, Ill. The commission held that a rate of 5½ cents the hundredweight was excessive and reduced it to 4 cents. In the opinion handed down the commission said the Cairo rate appears substantiated in the record. It awards reparations of $1007.59 to the Forb Mfg. Co., Hopkinsville, and $827.48 to the Dalton Bros. Brick Co., Hopkinsville, for the excess above 4 cents paid since April 20, 1923. The Illinois Central railroad will file the order in the District Court and seek further relief there.

Gravel shipments for highways near Valdosta, Ga., have been held up on account of a disagreement between two railroads as to the handling of the cars, according to a news dispatch from Valdosta.

American Zinc, Lead and Smelting Co. has leased 120 acres of land near Joplin, Mo., on which is a "chat" pile supposed to contain between 5,000,000 and 6,000,000 cu. yd. The chats will be used to make a paving material known as "bituminized chats." The price of the lease is reported to be $125,000, or 2½ cents per cubic yard.

Henrico Sand and Gravel Co. near Richmond, Va., is dredging a creek channel to permit the passage of its scows.

Badger Sand and Gravel Co., Wauwatosa, Wis., has increased its stock from $50,000 to $100,000.

Bids will be received until November 6 by the Louisiana Highway Commission, Reymond Bldg., for furnishing approximately 4931 cu. yd. of ...shed gravel for surfacing Federal Aid Project No. 136, Section "A" Lafayette-Broussard highway, Lafayette Parish. Further information may be obtained from J. M. Fourmy, state highway engineer.

H. D. Conkey & Co., of Mendota, plan to open a gravel pit in North Aurora, Ill., the machinery for which will cost $75,000.

Atlas Rock Co. has purchased a ranch at Oakdale, Calif., consisting of 160 acres, which is said to be underlaid with from 12 to 15 ft. of fine gravel and sand. It is stated that enough gravel is now in sight to keep the plant running for several years.

Craw Creek Gravel Co., Madison, Ark., was formerly the Bond Sand and Gravel Co.

Orange County Rock and Gravel Co., Long Beach, Calif., has been awarded the contract for 15,000 tons of sand at $5250 and 20,000 tons of gravel at $15,000 by the Los Angeles Board of Harbor Commissions for work to be done in the Wilmington harbor.

Lake county, Illinois, is reported to be considering the purchase of a gravel crusher estimated at about $12,000.

Cement

South Dakota's State Cement Plant, Rapid City, S. D., is under construction. It will have a capacity of 2000 bbl. per day.

San Antonio Portland Cement Co., San Antonio, Texas, is about to let the contract for erection of three 200-ft. concrete stacks.

Peerless Portland Cement Co., Union City, Mich., has increased its capital stock from $850,000 to $5,000,000.

Yosemite Portland Cement Co.'s $1,000,000 plant one mile north of Merced, Calif., is well under way under the direction of M. Steinmetz, chief engineer and general superintendent. Building of two spur tracks from the Yosemite Valley railroad is nearing completion, one to bring the raw material from the Yosemite Valley railroad which will carry it down from Jenkins Hill, and one to take the finished product to the warehouse. Work has not yet been begun on the spurs from the Santa Fe or the Southern Pacific.

Atlas Portland Cement Co. recently purchased 200 acres of land containing limestone deposits at Easton, Pa.

Union Portland Cement Co., Denver, Colo., is seeking reparation from the director-general of railroads for alleged overcharge on several carloads of cement that were shipped while the railroads were under federal control.

Bland Engineering Co. is building a warehouse at Nazareth, Pa., and not at Minneapolis as stated in the last issue.

Concrete Products

Gulf Concrete Pipe Co., Houston, Texas, of which N. A. Eppes is president, is to erect a $20,000 concrete building at 6500 Harrisburg boulevard for a factory.

Gibraltar Cement Block Co., Indianapolis, Ind., is operating both of its plants at capacity in the production of about 2700 concrete blocks daily.

Gypsum

Columbine Co. is the name of a new Idaho syndicate which has been formed to work deposits near Weiser, Idaho, and only 10 miles from the Certain-teed plant at Gypsum, Ore.

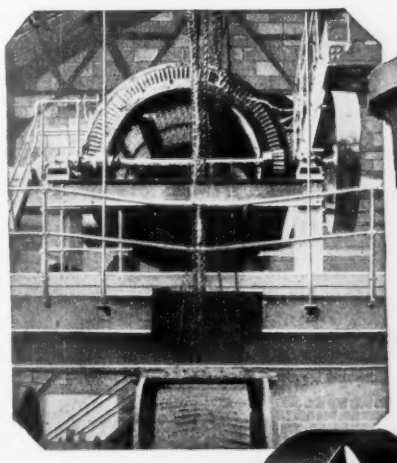
Lime

Mount Diablo Marl Co. has begun operations on its property near Walnut Grove, Calif., and is producing 100 tons of lime and marl per day.

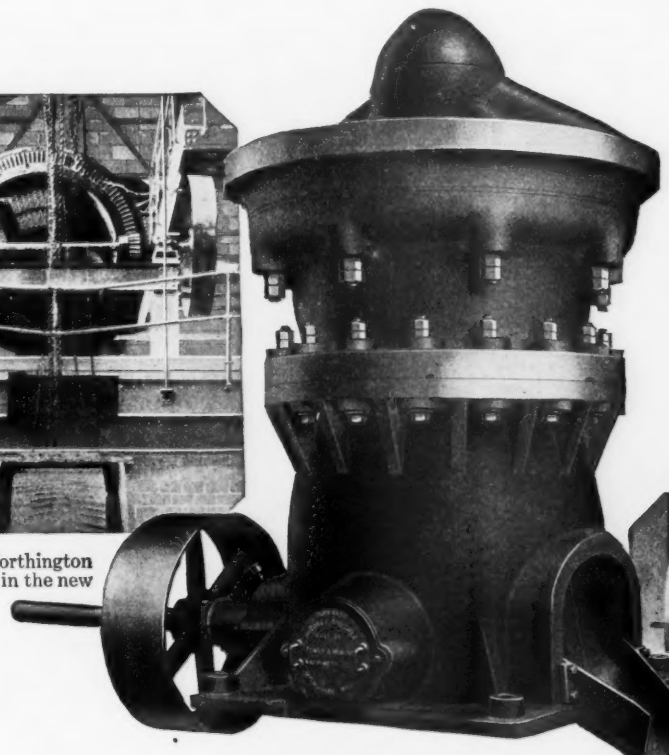
Worthington Crushers in the New Dixie Portland Cement Mill

The new mill of the Dixie Portland Cement Company, at Richard City, Tenn., has Worthington Superior McCully Gyratory Crushers.

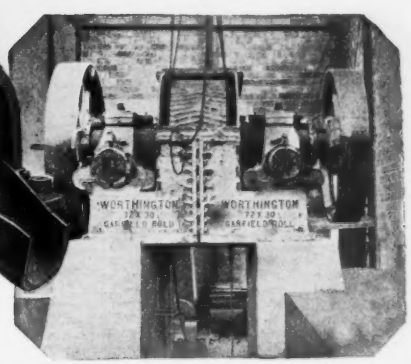
This plant is also equipped with screens and rolls made at the Worthington Power and Mining Works.



72" x 12" Worthington Rotary Screen in the new Dixie plant.



Superior McCully Gyratory Crusher.



Worthington-Garfield Roll installed in the new Dixie plant.

WORTHINGTON PUMP AND MACHINERY CORPORATION

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WORTHINGTON

Deane Works, *Holyoke, Mass.*
Blake & Knowles Works *East Cambridge, Mass.*
Worthington Works *Harrison, N. J.*
Laidlaw Works, *Cincinnati, Ohio.*
Hazleton Works, *Hazleton, Pa.*
Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works *Cudahy, Wis.*
Snow-Holly Works *Buffalo, N. Y.*
Epping-Carpenter, *Pittsburgh, Pa.*

Freight rates on lime in carloads from the various Missouri kilns of the Glencoe Lime and Cement Co. to points east of the Indiana-Illinois state line have been found unreasonable and unduly prejudicial by the Interstate Commerce Commission.

Soil testing for lime requirement is being carried on in several Ohio townships, according to the Kenyon, Ohio, News-Republican.

Silica Sand

Lester Bailey, a graduate of the University of Missouri, has been conducting experiments on the production of silica and recently discovered an immense deposit in Cape Girardeau county. Mr. Bailey says he intends to perfect a new process of grading and milling this deposit.

Phosphate Rock

El Paso Co-operative Phosphate Co. has been formed by the farmers of El Paso county, Texas, for buying and storing acid phosphate. They have erected two silos in El Paso which will store 600 tons.

Phosphate Products Co. of Philipsburg, Mont., is preparing to make its initial test shipment of 500 tons of phosphate rock to St. Louis. As far as known this will be the first phosphate to be shipped out of this district. If the material proves satisfactory, a good tonnage will be mined, as two large deposits are being developed.

Rock Asphalt

R. M. Hughes of Nevada, Mo., is organizing a company to develop the large beds of rock asphalt in Vernon county, Missouri.

Agstone

Freight rate reduction of from 10 to 13 cents on limestone from Buffalo and Linwood, Iowa, to northern Illinois has been announced by the Rock Island railroad, the rates applying to points on the Burlington railroad also.

Menomonie, Wis.—The opening of a lime crushing plant between Knapp and Wilson is being considered, according to a letter from D. P. Hughes, superintendent of the Dunn County School of Agriculture.

Bardstown, Ky.—Millions of tons of a clay, heretofore thought almost worthless, that is found in extensive deposits in a narrow belt from a half to three miles wide around the border of the Bluegrass region, are rich in lime and can be used in building up run-down farm lands, it was learned here from a message from the Kentucky Agricultural Experiment Station at Lexington. Representative samples of the clay analyzed by chemists at the experiment station were found to contain from 15 to 80 per cent calcium carbonate, a form of limestone that crumbles readily when handled. Discovery of the fact that the clay is rich in limestone is the result of a recent trip to Nelson county by S. C. Jones, soils extension specialist of the College of Agriculture. The belt in which the deposits are found starts at Vanceburg, on the Ohio river in Lewis county, circles southwest to Boyle county, where the deposits disappear, and then circles to the north and west of Louisville. This belt takes in an area of about 1000 square miles in which about two-thirds of the farm land is badly in need of limestone for successful clover growing, according to Mr. Jones. Hundreds of thousands of acres that are in need of liming can be reached with the clay after a haul of only a few miles, while the material already is present on thousands of other farms where lime is needed, he said. Discovery of the lime content of the deposits means that the land within the belt can be limed cheaper with the clay than by any other method, since there is no charge for freight and grinding and the material is ready to be spread as soon as it has been dug out.

Trade Literature

William Ganschow, president of the William Ganschow Co., is editing a new hand-book on Gears and Speed Transformers, which will be combined with the forthcoming Ganschow General Catalog No. 100. The purpose of the hand-book is to afford the user of gears and speed transformers easy access to formulae and data regarding their design and use. It contains much data that is usually found only in general engineering handbooks and will undoubtedly be welcomed by users of this sort of equipment as a ready reference volume. Aside from the formulae and data pertinent to gears and speed transformers, it also contains much information that is useful in the designing of machinery to which they may be applied. There are also tables showing strength and weight of materials, trigonometric functions, geometric formulae, decimal equivalents, wire and sheet metal gages and standard screw threads, together with other miscellaneous information. Being combined with the general Ganschow Catalog No. 100, it brings together in one volume all the information necessary for the design or specification of gears or gearing for any purpose, and shows complete lists for all products which are regularly manufactured by the William Ganschow Co. The Ganschow Hand-Book Catalog No. 100 is to be distributed gratis to all who use such materials as are made by the William Ganschow Co. It will be sent to manufacturing executives upon request to the company at 1001 West Washington boulevard, Chicago, Ill.

Monel Metal is issued by the International Nickel Co. of New York describing the various uses of this important corrosion-resisting alloy.

Seaverns Service Bins is a neat little pamphlet issued by the James B. Seaverns Co. of Chicago describing the steel bins made by this company.

Hauk Mfg. Co., Brooklyn, N. Y., has issued Bulletin 506 describing its atomizing oil burner called the Hauk venturi low-pressure oil burner.

W. A. Jones Foundry and Machine Co., Chicago, has issued catalog No. 27 on pulleys and No. L-28 on friction clutches. Both contain valuable technical information.

Trade Notes

Blaw-Knox Co., Pittsburgh, Pa., announces the opening of a Buffalo, N. Y., office at 622 Genesee Bldg. Mr. J. C. McQuide has been transferred from the Pittsburgh organization as manager of the Buffalo office. The Buffalo office will now serve northern and western New York and adjacent territory and is in position to give immediate and direct service in connection with Blaw-Knox products, including road-building machinery, clamshell buckets, forms, sectional steel buildings, structural steel, etc.

The Bertha-Consumers Co. of Pittsburgh, Pa., announces that the post office address of Elsie Mines Nos. 1, 2 and 3, formerly known as Dalna, Ky., has been changed to Elsiecoal, Ky. The post office address of Elsie No. 4 at Blackey, Ky., remains unchanged. Through the courtesy of the Louisville & Nashville railroad, the railroad billing stations have been changed as follows: Dalna, Ky., changed to Elsiecoal, Ky.; Smoot, Ky., changed to Elsie No. 1, Ky.; Wevaken, Ky., changed to Elsie No. 2, Ky., and Woodrock, Ky., changed to Elsie No. 4, Ky.

Personal

E. S. Tompkins, formerly with the Mine and Smelter Supply Co., has taken up his duties in the sales and engineering department of the Kennedy-Van Saun Mfg. and Eng. Corp., 50 Church street, New York City.

James A. Barr, Mount Pleasant, Tenn., has been making an inspection trip through the Florida phosphate mines.

B. S. Burley, who has been with the Concrete Pipe Co., Seattle, Wash., for the past six years, has been made manager of the branch plant at 1515 Dock street, Tacoma, Wash.

Joseph F. Gorman has been made vice-president of the Federal Lime and Stone Co., 1308 Williamson Bldg., Cleveland, Ohio.

Cement Production

September Output of 13,109,000 Barrels a New High Record—Shipments Declined Sharply

FOR the second successive month portland cement production has made a new high level. September output of 13,109,000 bbl. was 142,000 bbl. in excess of August, which had been the best previous month with 12,967,000. In September, 1922, production was 11,424,000 bbl., 1,685,000 bbl. below last month. For three-quarters of the year production has been 101,016,000 bbl., increase of 19,453,000 over the same period of 1922.

Shipments last month of 13,698,000 bbl. declined 1,273,000 from previous month, when they established a high of 14,971,000. In September, 1922, shipments were 12,444,000 bbl. For nine months shipments aggregated 104,607,000 bbl., against 88,684,000 in corresponding period of 1922, increase of 15,923,000. Since the first of the year shipments have been 3,591,000 bbl. greater than production, the excess having been drawn from previously accumulated stocks.

Stocks continue to decline. At the end of September they were 5,492,000, decline of 588,000 during the month. At the close of September, 1922, stocks were 4,724,000. They reached their highest in 1923 at 13,502,000 at the close of February. The high since beginning of 1922 was at the close of April of that year, at 14,470,000 bbl.

Following shows quarterly production and shipments and stocks on hand (in barrels) at the close of the quarter since the beginning of 1922:

1923	Production	Shipments	Stocks on hand
September quarter	38,696,000	42,381,000	5,492,000
June quarter	36,651,000	40,518,000	9,168,000
March quarter	25,669,000	21,708,000	13,045,000
1922			
December quarter	32,307,000	27,879,000	9,267,000
September quarter	34,645,000	40,655,000	4,724,000
June quarter	31,664,000	34,811,000	10,718,000
March quarter	15,254,000	13,218,000	13,848,000

B. A. Gayman, President of the Link-Belt Meese & Gottfried Company

WEST COAST operators in the rock products industries are fortunate in the acquisition of the new service organization formed by the recent consolidation of the Meese & Gottfried Co., of San Francisco, with the Link-Belt Co., of Chicago. Both organizations have been prominent in West Coast rock products industries and have splendid reputations for equipment and service.

The new president of the consolidated organization is B. A. Gayman, former secretary and treasurer of the Link-Belt Co., at Chicago, and one of the livest wires in the Link-Belt organization. He conducted the negotiations for the purchase of the Meese & Gottfried Co., and became so enthused at the prospects of the consolidated company, and came to like San Francisco and the West Coast so much, that he told the editor of Rock Products, on a recent visit, he had wired the president of the Link-Belt Co. at Chicago, he would like nothing better than a chance to manage the new enterprise. And he was immediately elected president.

Mr. Gayman is an engineer, as indeed are all the other officers of the Link-Belt organization, and is thoroughly alive to the possibilities of improving engineering details in the operating of rock products plants.

Quickstep Quarrying

THE time for quick-step quarrying has arrived. With high costs and a shortage of good available quarrymen, the old-fashioned slow-going mechanical methods won't do.

SPEED, today, is indispensable to success and nowhere more necessary than in rock drilling operations.

LOOK around you and weed out all the old slow-moving drilling equipment. Then put in a complete set of Waughs—from pluggers to drill sharpener—and see how the whole outfit immediately swings into quick-step.

THERE are no better, faster, or more economical rock drills to be had than Waughs. Tell us about your conditions and we'll provide a Waugh drill which will solve your problem speedily and satisfactorily.

"The Waugh Way Wins"

THE DENVER ROCK DRILL MANUFACTURING COMPANY

DENVER COLORADO

Rock Drills, Drill Steel Sharpeners and Hole Punchers, Portable Hoists

San Francisco	Duluth	Lima	Birmingham
Scranton	Joplin	Santiago	Melbourne
El Paso	Wallace	Butte	Mexico City
St Louis	Salt Lake City	New York	Pottsville
Seattle	Pittsburgh	Houghton	

ROCK WAUGH DRILLS

Canadian Rock Drill Company, Limited, Sole Agents in Canada
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The Denver Rock Drill & Machinery Company, Limited
Sole Agents in South Africa and Rhodesia
Southern Life Building, Johannesburgh, Transvaal, S. Africa
Andrews & George Company, Sole Agents in Japan, Tokio, Japan

R. P. 1

DODGE

MATERIAL HANDLING EQUIPMENT

Over 500 rolls like this on big ore handling job

That Dodge conveying equipment has met the requirements of severe service is partially illustrated in the above picture.

These rolls are ready to be loaded into cars for shipment to a big western mining project.

Dodge facilities for the design and construction of material handling equipment that will deliver at capacity under severe, continuous service, will save you time and money on your job.

Write us for our complete catalog of elevating and conveying equipment. It contains information you should have.

DODGE MANUFACTURING CORPORATION

General Offices: Mishawaka, Ind. **Works: Mishawaka, Ind. and Oneida, N. Y.**

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Boston	Atlanta	Newark	Minneapolis	St. Louis
Philadelphia	Chicago	San Francisco	Houston	Oneida

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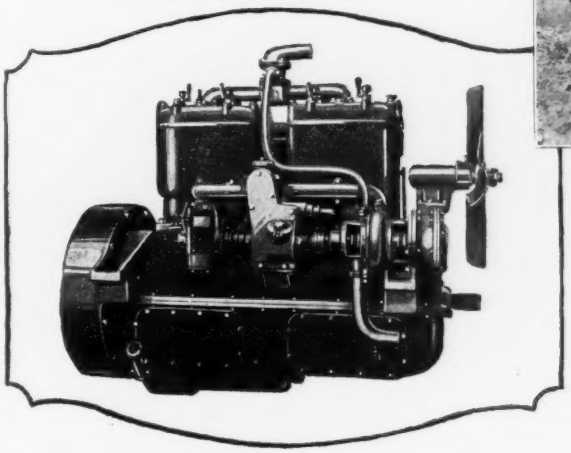

¾ Yard, Crawler Type, Gasoline Shovel, made by Northwest Engineering Co., Green Bay, Wis.

Nothing encourages loafing on a job so much as an engine that loafs.

CLIMAX

"The Trustworthy Engine"

puts every man on his toes to keep up the pace it sets.

Write for Catalog

CLIMAX ENGINEERING CO.

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Used as Standard Equipment by—

Equitable Asphalt Maintenance Co., Kansas City, Mo.
Bay City Dredge Works, Bay City, Mich.
Byers Machine Co., Ravenna, Ohio.
Victor R. Browning, Cleveland, Ohio.
Link Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, O.
Moore Speedcrane, Inc., Chicago, Ill.
Northwest Engineering Co., Green Bay, Wis.
Orton & Steinbrenner, Huntington, Ind., and others.

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The Ottumwa is a light weight, steel constructed box car loader. It offers a practical way to cut costs in loading loose and bulk materials in box cars, as it requires but part time of one man to operate.

It is operated by either electric motor or gasoline engine, has a novel and quick raising or lowering device for adjusting delivery. Roller and ball bearings used throughout — Alemite Greasing System— Belt carried on rollers, reducing power consumption to a minimum.

Backed by 25 years' loading experience.

ENGINEERING SERVICE FREE

MANUFACTURERS

OTTUMWA BOX CAR LOADER COMPANY, OTTUMWA IOWA.

BEST BOX CAR LOADERS AND UNLOADERS

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

Air Compressors
Denver Rock Drill Mfg. Co., Denver, Colo.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Worthington Pump & Mchy. Corp., New York, N. Y.

Air Separators
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
R. M. Gay Co., Inc., New York, N. Y.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mchy. Co., Kingston, N. Y.

Automatic Weighers
Merrick Scale Mfg. Co., Passaic, N. J.
Richardson Scale Co., Passaic, N. J.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Babbitt Metal
Ajax Metal Co., Philadelphia, Pa.
Lewistown Fdy. & Machine Co., Lewistown, Pa.

Bags and Bagging Machinery
Jaite Co., Jaite, Ohio

Balls (Tube Mill, etc.)
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Hardinge Co., New York, N. Y.
Worthington Pump & Mchy. Corp., New York, N. Y.

Belt Fasteners and Hooks
Crescent Belt Fastener Co., New York City

Belt Lacing and Rivets
Crescent Belt Fastener Co., New York City

Bins and Bin Gates
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Mchy. Co., Cleveland, Ohio
Easton Car and Construction Co., Easton, Pa.
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Weller Mfg. Co., Chicago, Ill.

Blasting Powder
Atlas Powder Co., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio

Boiler Insulation
Celite Products Co., Chicago, Ill.

Boilers (Water Tube)
Jackson & Church Co., Saginaw, Mich.

Box Car Loaders
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Brick Machinery
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Jackson & Church Co., Saginaw, Mich.
Shope Brick Co., Portland, Ore.

Buckets (Elevator and Conveyor)
American Manganese Steel Co., Chicago Heights, Ill.
Brown Hoisting Mchy. Co., Cleveland, Ohio
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., Columbus, Ohio
Lewistown Fdy. & Machine Co., Lewistown, Pa.
Smith Engineering Works, Milwaukee, Wis.
Taylor Wharton Iron & Steel Co., High Bridge, N. J.
W. Toepfer & Sons Co., Milwaukee, Wis.
Weller Mfg. Co., Chicago, Ill.

Buckets (Grab, Clambshell, etc.)
Brown Hoisting Mchy. Co., Cleveland, Ohio
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, Ohio
Orton & Steinbrenner Co., Chicago, Ill.

Burr Mills
Butterworth & Lowe, Grand Rapids, Mich.
Munson Mill Machinery Co., Utica, N. Y.

Cableways
Interstate Equipment Corp., New York, N. Y.

Calcining Kettles (Gypsum)
American Process Co., New York, N. Y.
Butterworth & Lowe, Grand Rapids, Mich.

Car Movers
Atlas Railway Supply Co., Chicago, Ill.

Car Pullers
Ottumwa Box Car Loader Co., Ottumwa, Iowa
Thomas Elevator Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Cars (Quarry)
Atlas Car & Mfg. Co., Cleveland, Ohio
Easton Car and Construction Co., Easton, Pa.
United Iron Works, Inc., Kansas City, Mo.

Chain (Steam Shovel)
Carroll Chain Co., Columbus, Ohio

Chain Drives
Dodge Mfg. Corp., Mishawaka, Ind.
Link-Belt Co., Chicago, Ill.

Clamps
Knox Mfg. Co., Philadelphia, Pa.

Clutches
Dodge Mfg. Corp., Mishawaka, Ind.
The Hill Clutch Co., Cleveland, Ohio

Coal Pulverizing Equipment
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fuller-Lehigh Co., Fullerton, Pa.
R. M. Gay Co., Inc., New York, N. Y.
Hardinge Co., New York, N. Y.
K-B Pulverizer Co., Inc., New York City
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

Colors (Cement and Mortar)
C. K. Williams & Co., Easton, Pa.

Conveyors and Elevators
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Mchy. Co., Cleveland, Ohio
Dodge Mfg. Corp., Mishawaka, Ind.
Jeffrey Mfg. Co., Columbus, Ohio
Kennedy-Van Saun Mfg. & Eng. Corp., New York City
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
W. Toepfer & Sons Co., Milwaukee, Wis.
United Iron Works, Inc., Kansas City, Mo.
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

Core Drilling
Pennsylvania Drilling Co., Pittsburgh, Pa.

Couplings
Knox Mfg. Co., Philadelphia, Pa.

Cranes (Crawler)
Brown Hoisting Mchy. Co., Cleveland, Ohio
Bucyrus Co., S. Milwaukee, Wis.
Byers Machine Co., Ravenna, Ohio
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Koehring Co., Milwaukee, Wis.
Link-Belt Co., Chicago, Ill.
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio

Cranes (Locomotive)
American Hoist & Derrick Co., St. Paul, Minn.
Brown Hoisting Mchy. Co., Cleveland, Ohio
Byers Machine Co., Ravenna, Ohio
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.
Northwest Engineering Co., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, Ohio
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., Marion, Ohio

Cranes (Overhead Electric Traveling)
Morgan Engineering Co., Alliance, Ohio

Crushers (Hammer)
Jeffrey Mfg. Co., Columbus, Ohio
Pennsylvania Crusher Co., Philadelphia, Pa.
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

Crushers (Jaw and Gyratory)
Acme Road Mchy. Co., Frankfort, N. Y. (Jaw)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Austin Mfg. Co., Chicago, Ill.
C. G. Buchanan Co., New York City
Butterworth & Lowe, Grand Rapids, Mich.
R. M. Gay Co., Inc., New York, N. Y.
Hardinge Co., New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City
Lewistown Fdy. & Machine Co., Lewistown, Pa. (Jaw)
Morgan Engineering Co., Alliance, Ohio
New Holland Machine Co., New Holland, Pa.
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
United Iron Works, Inc., Kansas City, Mo. (Jaw)
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo. (Jaw)
Worthington Pump & Mchy. Corp., New York, N. Y.

Crusher Protectors
Dings Magnetic Separator Co., Milwaukee, Wis.

Crushing Rolls
C. G. Buchanan Co., New York City
Kennedy-Van Saun Mfg. & Eng. Corp., New York City
McLanahan Stone Machine Co., Hollidaysburg, Pa.
New Holland Machine Co., New Holland, Pa.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
United Iron Works, Inc., Kansas City, Mo.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo.
Worthington Pump & Mchy. Corp., New York, N. Y.

Derricks
Thomas Elevator Co., Chicago, Ill.

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co., Chicago Heights, Ill.
Erie Steam Shovel Co., Erie, Pa.
Taylor Wharton Iron & Steel Co., High Bridge, N. J.

Draglines
Bucyrus Co., S. Milwaukee, Wis.
Erie Steam Shovel Co., Erie, Pa.
Koehring Co., Milwaukee, Wis.
Northwest Engineering Co., Chicago, Ill.
Osgood Co., Marion, Ohio

Dragline Cableway Excavators
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.

Dredge Chain
Carroll Chain Co., Columbus, Ohio

Dredges (Hydraulic)
Bucyrus Co., South Milwaukee, Wis.

Dredges (Sand and Gravel)
American Manganese Steel Co., Chicago Heights, Ill.
Morris Machine Works, Baldwinsville, N. Y.
Thomas Elevator Co., Chicago, Ill.

Drills (Blast Hole)
Armstrong Mfg. Co., Waterloo, Iowa
Sanderson-Cyclone Drill Co., Orrville, Ohio

Drills (Steel)
Denver Rock Drill Mfg. Co., Denver, Colo.

Dryers
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Process Co., New York, N. Y.
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Kennedy-Van Saun Mfg. and Eng. Corp., New York, N. Y.
Lewistown Fdy. & Machine Co., Lewistown, Pa.
McGann Mfg. Co., York, Pa.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

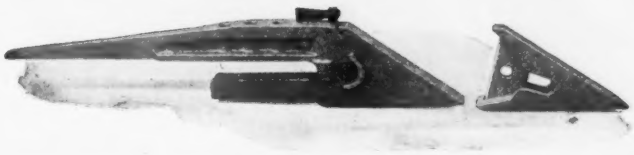
Dust Collecting Systems
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

Dynamite
Atlas Powder Co., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio

Engineers
Acme Road Mchy. Co., Frankfort, N. Y.
J. C. Buckbee Co., Chicago, Ill.
Robt. W. Hunt & Co., Chicago, Ill.
Kritzer Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
McGann Mfg. Co., York, Pa.
H. Miscampbell, Duluth, Minn.
Pennsylvania Drilling Co., Pittsburgh, Pa.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.
R. D. Wood & Co., Philadelphia, Pa.

Engines (Gasoline, Kerosene and Oil)
American Hoist & Derrick Co., St. Paul, Minn.
Armstrong Mfg. Co., Waterloo, Iowa
Climax Engineering Co., Clinton, Iowa
Power Mfg. Co., Marion, Ohio
Worthington Pump & Mchy. Corp., New York, N. Y.

AMSCO CLARK REVERSIBLE DIPPER TEETH



A heavy duty two part tooth. Designed to meet the most severe digging conditions. Particular attention is directed to the wedge type bolt entering through the side, which not only provides an easy means for renewing or reversing the point but also when drawn up keeps the point tight on the base.

The tooth is constructed so that there is no shear on the bolt and side lugs provided on the point overcome the tendency of the base to spread, eliminating the effect of side thrust.

It will pay you to investigate our exchange proposition on Clark Reversible Dipper Teeth

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"The Steel for Service"

American Manganese Steel Co.

General Sales Office

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Foundries: Chicago Heights, Ill.; New Castle, Del., and Oakland, Cal.

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"CARROLL" SOLID WELD STEAM SHOVEL CHAIN contributes directly to increased and economical production.

It contributes directly to keeping your steam shovel at work continuously and at minimum expense.

"CARROLL" SOLID WELD CHAINS are fundamentally correct in raw material, workmanship and method of manufacture. They provide a safe investment for the Purchaser and a source of genuine satisfaction for the Operator.

Write today for complete information

The Carroll Chain Company

Columbus, Ohio

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

Engines (Steam)
American Hoist & Derrick Co., St. Paul, Minn.
Jackson & Church Co., Saginaw, Mich.
Morris Machine Works, Baldwinsville, N. Y.

Explosives (See Blasting Powder and Dynamite)

Frogs and Switches
Central Frog & Switch Co., Cincinnati, Ohio
Easton Car and Construction Co., Easton, Pa.

Fuses (Detonating and Safety)
Atlas Powder Co., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio

Gas Producers
Morgan Construction Co., Worcester, Mass.
R. D. Wood & Co., Philadelphia, Pa.

Gears (Spur, Helical, Worm)
Taylor Wharton Iron & Steel Co., High Bridge, N. J.

Grizzlies
Austin Mfg. Co., Chicago, Ill.
Robins Conveying Belt Co., New York City
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.

Gypsum Plaster Plants
Butterworth & Lowe, Grand Rapids, Mich.

Hoists
American Hoist and Derrick Co., St. Paul, Minn.
Denver Rock Drill Mfg. Co., Denver, Colo.
Hyman-Michaels Co., Chicago, Ill.
Industrial Works, Bay City, Mich.
Jackson & Church Co., Saginaw, Mich.
Thomas Elevator Co., Chicago, Ill.
United Iron Works, Inc., Kansas City, Mo.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

Hose Menders
Knox Mfg. Co., Philadelphia, Pa.

Hydrators (Lime)
Kritzer Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Insulation (Heat)
Celite Products Co., Chicago, Ill.

Kilns (Rotary)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City
McGann Mfg. Co., York, Pa.
H. Miscampbell, Duluth, Minn.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

Kilns (Shaft)
McGann Mfg. Co., Inc., York, Pa.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Lime Handling Equipment
Kritzer Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
H. Miscampbell, Duluth, Minn.
Raymond Bros., Impact Pulv. Co., Chicago, Ill.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Sturtevant Mill Co., Boston, Mass.

Loaders and Unloaders
Brown Hoisting Mchy. Co., Cleveland, Ohio
Jeffrey Mfg. Co., Columbus, Ohio
Link-Belt Co., Chicago, Ill.
Northwest Engineering Co., Chicago, Ill.
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Locomotives (Steam, Gas, and Electric)
Baldwin Loco. Wks., Philadelphia, Pa. (Steam)
Davenport Loco. Wks., Davenport, Iowa (Steam and Gas)
Fate-Root-Heath Co., Plymouth, Ohio (Gas)
Ironton Eng. Co., Ironton, Ohio (Electric)
Jeffrey Mfg. Co., Columbus, Ohio (Electric)
Lima Locomotive Works, Lima, Ohio (Steam)
Milwaukee Loco. Mfg. Co., Milwaukee, Wis. (Gas)
Vulcan Iron Works, Wilkes-Barre, Pa. (Steam)

Lubricating Systems
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Magnetic Devices (Pulleys, etc.)
Dings Magnetic Separator Co., Milwaukee, Wis.

Manganese Steel (Castings, Repair Parts, etc.)
American Manganese Steel Co., Chicago Heights, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Taylor Wharton Iron & Steel Co., High Bridge, N. J.

Mills, Grinding (Ball, Tube, etc.)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bradley Pulverizer Co., Allentown, Pa.
Hardinge Co., New York, N. Y.
Jackson & Church Co., Saginaw, Mich.
Lewistown Fdy. & Machine Co., Lewistown, Pa
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Worthington Pump & Mchy. Corp., New York, N. Y.

Motors and Generators (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Nipples
Knox Mfg. Co., Philadelphia, Pa.

Nozzles
Knox Mfg. Co., Philadelphia, Pa.

Perforated Metal
Cross Engineering Co., Carbondale, Pa.
Harrington & King Perforating Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
W. Toepfer & Sons Co., Milwaukee, Wis.

Pipe (Dredge, etc.)
R. D. Wood & Co., Philadelphia, Pa.

Portable Conveyors
Austin-Western Rd. Mchy Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, Ohio

Portable Engines
Climax Engineering Co., Clinton, Iowa

Power Units
Climax Engineering Co., Clinton, Iowa

Pulleys
The Hill Clutch Co., Cleveland, Ohio

Pulleys (Magnetic)
C. G. Buchanan Co., New York, N. Y.

Pulverizers
Bradley Pulverizer Co., Allentown, Pa.
Fuller-Lehigh Co., Fullerton, Pa.
Hardinge Co., New York, N. Y.
Jeffrey Mfg. Co., Columbus, Ohio
K-B Pulverizer Co., Inc., New York City
Kent Mill Co., Brooklyn, N. Y.
Munson Mill Machinery Co., Utica, N. Y.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Universal Crusher Co., Cedar Rapids, Iowa
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Heights, Ill.
Morris Machine Works, Baldwinsville, N. Y.

Pumps (Water, etc.)
Emerson Pump and Valve Co., Alexandria, Va.
Morris Machine Works, Baldwinsville, N. Y.
Pennsylvania Pump and Compressor Co., Easton, Pa.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo.
Worthington Pump & Mchy. Corp., New York, N. Y.

Rails
Easton Car and Construction Co., Easton, Pa.

Railway Supplies
Atlas Railway Supply Co., Chicago, Ill.

Road Machinery
Acme Road Mchy. Co., Frankfort, N. Y.
Austin-Western Rd. Mchy. Co., Chicago, Ill.
Brown Hoisting Mchy. Co., Cleveland, Ohio
Koehring Co., Milwaukee, Wis.
Northwest Engineering Co., Chicago, Ill.
Universal Road Mchy. Co., Kingston, N. Y.

Rock Drills
Denver Rock Drill Mfg. Co., Denver, Colo.

Scales (See Weighing Equipment)

Scrapers (Drag, etc.)
Austin-Western Rd. Mchy. Co., Chicago, Ill.
Northwest Eng. Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.

Screens
Acme Road Mchy. Co., Frankfort, N. Y.
Austin-Western Rd. Mchy. Co., Chicago, Ill.
Cleveland Wire Cloth Co., Cleveland, Ohio
Cross Engineering Co., Carbondale, Pa.
Dodge Mfg. Corp., Mishawaka, Ind.
R. M. Gay Co., Inc., New York, N. Y.
Harrington & King Perforating Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City
Kent Mill Co., Brooklyn, N. Y.
Link-Belt Co., Chicago, Ill.
McLanahan Stone Machine Co., Hollidaysburg, Pa.
Robins Conveying Belt Co., New York City
Smith Engineering Wks., Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.
W. S. Tyler Co., Cleveland, Ohio
United Iron Works, Inc., Kansas City, Mo.
Universal Crusher Co., Cedar Rapids, Iowa
Weller Mfg. Co., Chicago, Ill.
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

Screens (Electric Vibrating)
W. S. Tyler Co., Cleveland, Ohio

Separators (Magnetic)
C. G. Buchanan Co., New York, N. Y.
Dings Magnetic Separator Co., Milwaukee, Wis.

Shafting
The Hill Clutch Co., Cleveland, Ohio

Sharpening Machines
Denver Rock Drill Mfg. Co., Denver, Colo.

Shovels (Steam, Gas and Electric)
Bucyrus Co., S. Milwaukee, Wis.
Erie Steam Shovel Co., Erie, Pa.
Koehring Co., Milwaukee, Wis.
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio

Sprockets and Chain
American Manganese Steel Co., Chicago Heights, Ill.
Dodge Mfg. Corp., Mishawaka, Ind.
Jeffrey Mfg. Co., Columbus, Ohio
Taylor Wharton Iron & Steel Co., High Bridge, N. J.

Steel Plate Construction
Hendrick Mfg. Co., Carbondale, Pa.
Jackson & Church Co., Saginaw, Mich.

Testing Sieves and Shakers
W. S. Tyler Co., Cleveland, Ohio

Track Equipment
Central Frog and Switch Co., Cincinnati, Ohio
Easton Car and Construction Co., Easton, Pa.

Tramways (Aerial Wire Rope)
Interstate Equipment Corp., New York City.
A. Leschen & Sons Rope Co., St. Louis, Mo.

Transmission Machinery
Dodge Mfg. Corp., Mishawaka, Ind.
The Hill Clutch Co., Cleveland, Ohio
Kritzer Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Valves (Throttle)
Emerson Pump and Valve Co., Alexandria, Va.
Knox Mfg. Co., Philadelphia, Pa.

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Lewistown Fdy. & Machine Co., Lewistown, Pa.
Link-Belt Co., Chicago, Ill.
McLanahan Stone Machine Co., Hollidaysburg, Pa.
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.

Weighing Equipment
Merrick Scale Mfg. Co., Passaic, N. J.
Richardson Scale Co., Passaic, N. J.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

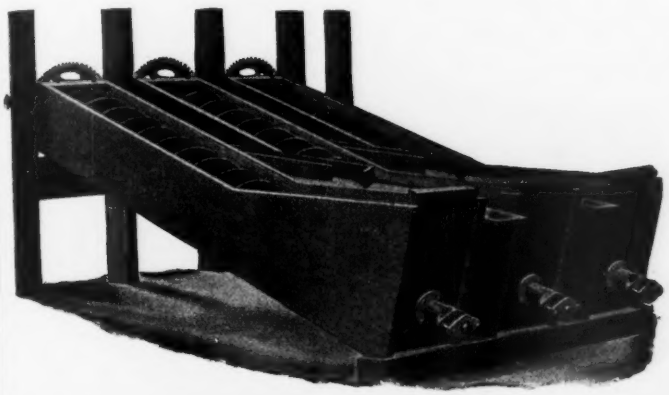
Wheels (Car)
Easton Car and Construction Co., Easton, Pa.
Taylor Wharton Iron & Steel Co., High Bridge, N. J.

Wire Cloth
Cleveland Wire Cloth Co., Cleveland, Ohio
W. S. Tyler Co., Cleveland, Ohio

Wire Rope
American Steel & Wire Co., Chicago, Ill.
Armstrong Mfg. Co., Waterloo, Iowa
A. Leschen & Sons Co., St. Louis, Mo.
Williamsport Wire Rope Co., Williamsport, Pa.

Mr. Sand Man!

IF it's clean sand you want to produce and you are unable to do so, write to us and state your trouble and we can help you to solve your problem. We make machinery that produces the cleanest Glass Sand.



The Lewistown Equipment, which includes Crushing, Grinding, Screening, Washing, Drying and Conveying Machinery, will produce more and a better quality of Glass Sand, at a bigger profit than any other equipment on the market.

LEWISTOWN FOUNDRY & MACHINE COMPANY
Lewistown, Pa.

Dependable Haulage

The popularity of Milwaukee Gasoline Locomotives in the road building, construction and general industrial fields is due to their proven dependability, long life and continuous low cost of operation.

All Milwaukee Locomotives are sold on the basis of performance—they're guaranteed.

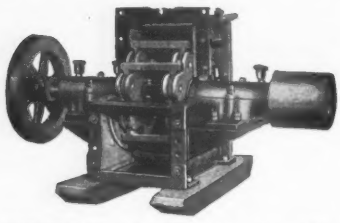
Write for Catalog O-121—today—NOW!

MILWAUKEE LOCOMOTIVE MFG. CO.
MILWAUKEE, WISCONSIN
U. S. A.

MILWAUKEE GASOLINE LOCOMOTIVES

K-B PULVERIZER

All Steel, Through and Through



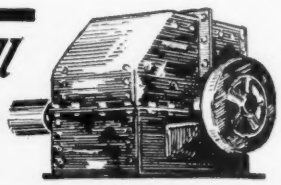
From the heavy cast steel frame to the tough, hard manganese steel hammers, breaker blocks and lining plates, the K-B Pulverizer is ALL STEEL—built to stand the hardest service that can come upon it and still be ready for more.

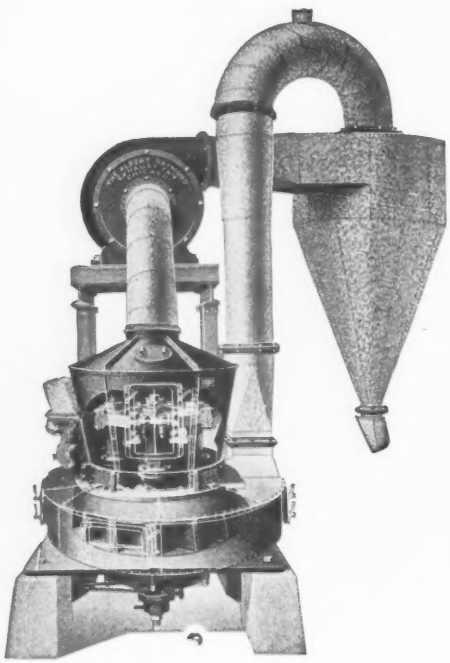
And the weight of the hammers is in the striking part, where it belongs—where it does the most work—where it hits the heaviest blow with the least power to drive it. Minimum upkeep cost, minimum power cost, maximum output—that's what you get in the K-B Pulverizer.

Write for the Catalog.

K-B PULVERIZER 92 Lafayette St. New York, N. Y.

K-B *The All Steel Hammer Mill* Pulverizer





When one of the leading cement companies in this country purchases 15 Raymond Roller Mills over a period of 15 years to replace other equipment for grinding their coal, it is pretty good evidence that these mills have proved the most economical equipment for this work.

Raymond Bros. Impact Pulverizer Co.

1301 N. BRANCH ST. CHICAGO, ILL.

Eastern Office, 50 Church St., NEW YORK CITY
Western Office, 1002 Washington Bldg., Los Angeles

England Joins Hands With America

in proclaiming Bradley Pulverizers as standard equipment in cement plants.

The Ship Canal Portland Cement Co., Ellesmereport, England, like most other progressive cement manufacturers in all parts of the world have standardized on our mills.

More cement materials are pulverized by the

Griffin Mill, Bradley 3 Roll Mill, and Bradley Hercules Mills

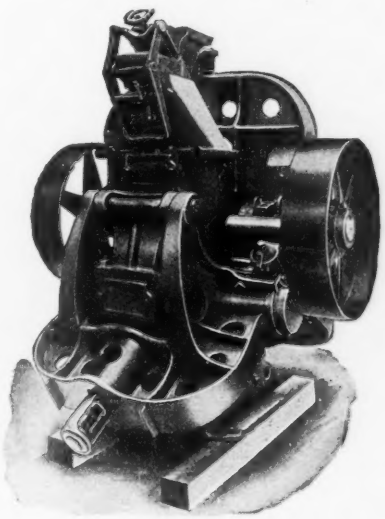
than most all other pulverizers combined.

"A Bradley Mill Means Efficiency and Satisfaction"

Bradley Pulverizer Co.

Boston, Mass. **London, England** **Works, Allentown, Pa.**

Manufacturers of Pulverizing Machinery since 1889.



MAXECON MILL

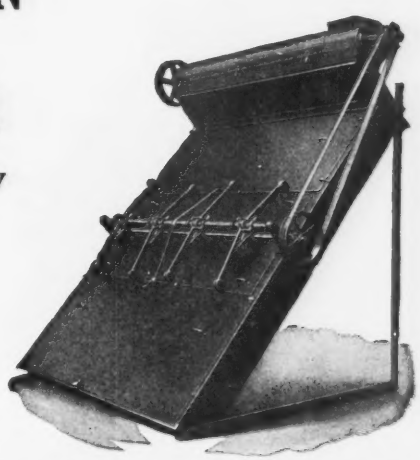
For Fine Pulverizing of

Limestone, Gypsum, Phosphate, etc.

EFFICIENT—ECONOMICAL—RELIABLE

PERFECTECON SCREEN SEPARATOR

For Large Capacity Screening

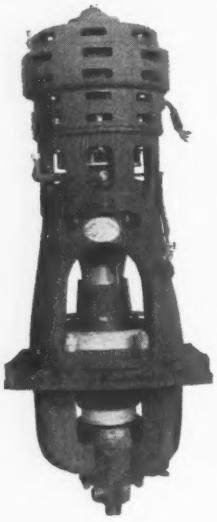


Let These Solve Your Cost and Trouble Problems

KENT MILL COMPANY

10 Rapelye Street **Brooklyn, N. Y.**

The Weston Direct Drive Gyratory Crusher for Secondary Reduction of Hard Rock, Ore and Gravel



Developed in a Granite Crushing Plant

This machine fills the need for a secondary crusher of large capacity and great strength for work in all friable rock.

The first machine, installed more than two years ago, has established remarkable records for capacity, low power consumption and general economy in operation. Later installations have more than proved all claims for the machine.

The construction is all-steel with Chrome-Vanadium forged steel shaft of large size, and with full-bearing eccentric, bronze bushed inside and out.

The entire machine is arranged to give freedom from costly delays. Positive lubrication without pumps—Dust prevention in bearings—Greater wear on manganese before replacement—Ease of adjustment and repair—and a sturdy oversize motor—All work to your advantage.

Crusher is simple in design and the best practice in modern Engineering is utilized. Built in six standard sizes to follow any primary, smallest machine can be set to ½" with large capacity.

Arranged for direct motor, or belt drive.

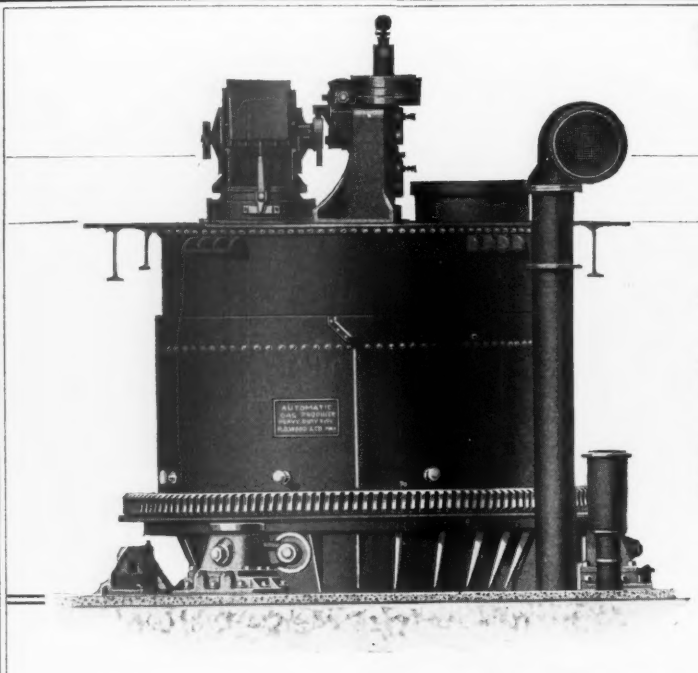
Bulletin No. 25-A describes this machine in detail

THE MORGAN ENGINEERING COMPANY
ALLIANCE, OHIO

Chicago
122 S. Michigan Ave.

Designers, Manufacturers and Contractors
Electric Traveling Cranes, Rolling Mill Machinery
Ordnance, Steel, Shipbuilding and Forging Plants Complete
Rock Crushers, Special Machinery for Any Purpose

Pittsburgh
1420 Oliver Bldg.
Birmingham, Ala.
Brown-Marx Bldg.



WOOD AUTOMATIC GAS PRODUCERS

What do you expect?

What do you expect of your gas producers?

Isn't it worth your while to investigate a make that will undoubtedly give you more for your investment than you are getting?

R. D. Wood and Company's Automatic Gas Producers operate with unusually low labor and maintenance costs and special features effect exceptional efficiencies.

Used in Leading Lime Plants.

Our Catalog Will Interest You. Write for It

HYDRAULIC MACHINERY AND OPERATING VALVES

R. D. WOOD & CO.
ESTABLISHED 1803
PHILADELPHIA, PA.

CAST IRON PIPE, HYDRANTS AND VALVES

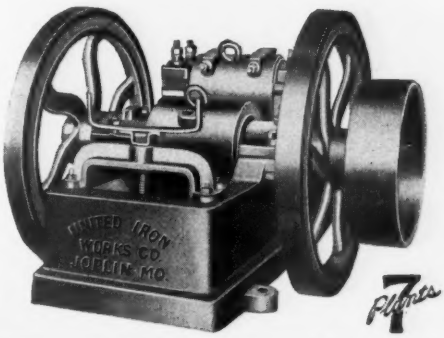
"United" crushers are low in first cost and operating cost—easy to install

"United" Blake type jaw crushers are of an unusually efficient design. They have large capacity, are simple in operation and all parts are readily accessible. The size of the crushed product may be adjusted while the crusher is in operation. It differs from other types in that the large pieces of rock are received on the upper part of jaws, where the motion is least and leverage greatest, rock being crushed with smallest expenditure of energy.

Additional advantages are the low initial cost and ease of installation.

There is a "United" representative near you. He can assist you in solving your equipment problems, without obligation.

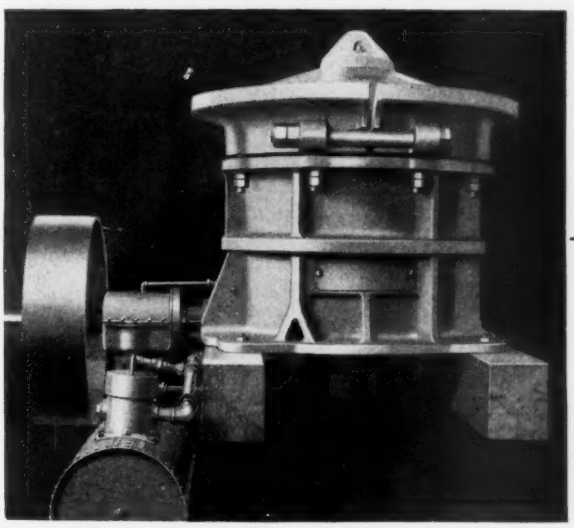
Write for Catalog B-24.



United Iron Works, Inc.
Kansas City, Mo.

Designers and Manufacturers of Crushers, Hoists, Screens, Cars, Pumps, Concentrating Tables, Mill Equipment, etc., etc.

"UNITED" IRON WORKS INC. FOR SERVICE



TELSMITH
DEFIES TRAMP IRON

Even the most careful operator can't keep occasional drill-points, hammers and bits of steel from the crusher feed. Under such conditions, it needs little argument to show the advantage of the Telsmith bolt-shaft—short, heavy, held rigidly at both ends by expansible taper bushings. Telsmith can safely guarantee this huge bolt for two years, even against breakage by tramp iron. Remember then—***a guaranteed shaft.***

The crown is CAST STEEL, not cast iron as in the ordinary gyratory crusher. The arch is low; the arms and rim are of massive design. Telsmith makes the same guarantee. Mark that down then—***a guaranteed crown.***

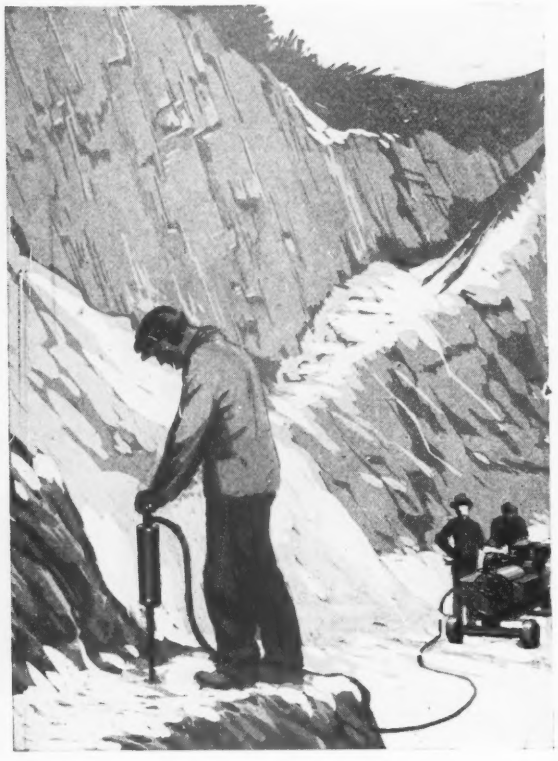
The frame is STEEL, too. Short in structure, thickly walled, with heavy, vertical and horizontal ribs, it is like the biblical "tower of strength." Telsmith guarantees it. Note that—***a guaranteed frame.***

On other machines, you carry your own risk; but when you buy a Telsmith crusher, you buy "Crusher Insurance." We will be glad to mail you catalog No. 166 (Telsmith Primary Breakers) and bulletin No. 2F11 (Telsmith Reduction Crushers). No obligation.

SMITH ENGINEERING WORKS, 3188 LOCUST STREET, MILWAUKEE, WISCONSIN

Canadian Representatives: Canadian Ingersoll-Rand, Montreal, P. Q.

ATLAS
EXPLOSIVES
for quarrying



IN practically every kind of quarry blasting Atlas Ammite will do better work—and at less cost. Furthermore, as Ammite will not freeze, its use saves the time and labor that are lost in thawing ordinary explosives. Let the Atlas Service Man help you determine what grade of Ammite will save the most money for you.

AMMITE
—cannot freeze—

ATLAS POWDER COMPANY
WILMINGTON, DELAWARE

Branch Offices:
Allentown, Pa.; Birmingham, Ala.; Boston, Mass.; Charleston, W. Va.; Chicago, Ill.; Des Moines, Iowa; Houghton, Mich.; Joplin, Mo.; Kansas City, Mo.; Knoxville, Tenn.;

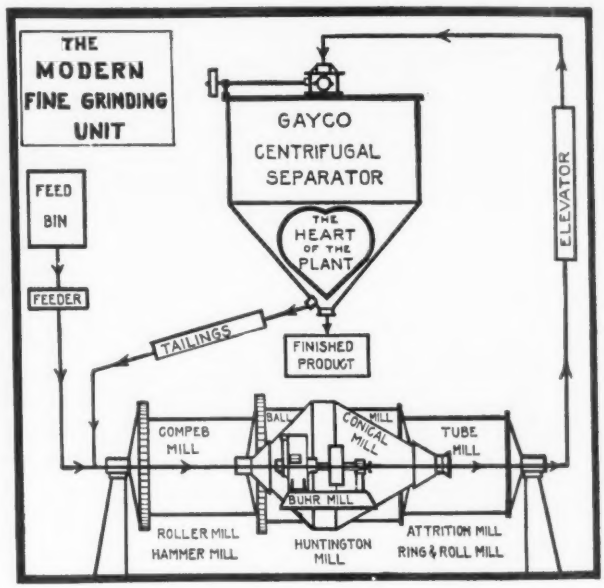
ATLAS EXPLOSIVES

Branch Offices:
McAlester, Okla.; New Orleans, La.; New York City, N. Y.; Norristown, Pa.; Philadelphia, Pa.; Pittsburg, Kans.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis, Mo.; Wilkes-Barre, Pa.

GAYCO

CENTRIFUGAL SEPARATORS

Increase the Capacity of Your Mills
Improve the Quality of Your Products
Maintain a Uniformly Fine Output



Any Mill—Any Material—Any Fineness

Products—60 mesh to 350 mesh

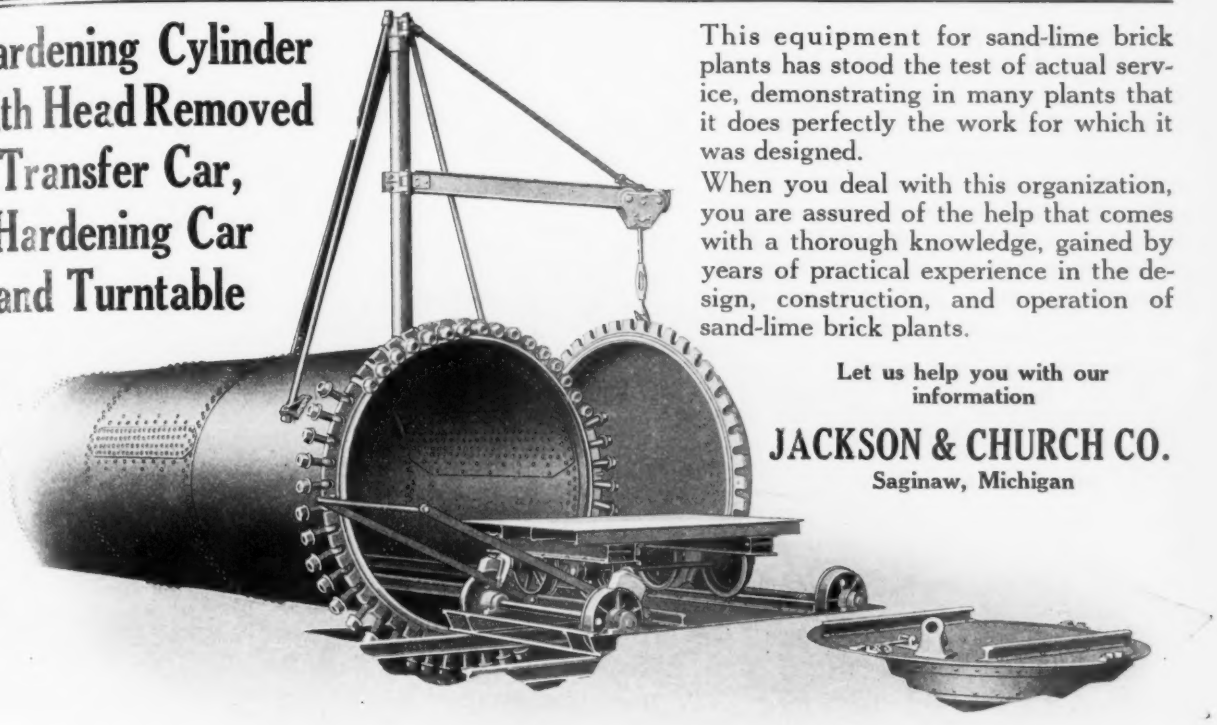
Little Wear—Small Power—No Attention
Built to run 24 hours a day, 365 days a year

THREE YEARS OF UNPRECEDENTED SUCCESS

Write for Bulletin D

Rubert M. Gay Company, Inc.
114 Liberty Street **New York, N. Y.**

Hardening Cylinder with Head Removed Transfer Car, Hardening Car and Turntable



This equipment for sand-lime brick plants has stood the test of actual service, demonstrating in many plants that it does perfectly the work for which it was designed.

When you deal with this organization, you are assured of the help that comes with a thorough knowledge, gained by years of practical experience in the design, construction, and operation of sand-lime brick plants.

Let us help you with our information

JACKSON & CHURCH CO.
Saginaw, Michigan

"We Recommend Them Highly To Anyone—"

With their flexible driving shafts and all-wheel drive, Shays operate on curves and grades impossible for other engines.

"We have been using a Shay Geared Locomotive for the past six years. We are very well pleased with the service we secure from our Shay and recommend Shays highly to anyone desiring the locomotive which has to be used on sharp turns and excessive grades."

Investigate the refinements in Shay construction. Ask us why Shays are the choice of quarry men who require a time-saving, economical engine.

LIMA
***Shay Geared* LOCOMOTIVES**

LIMA LOCOMOTIVE WORKS
Incorporated
Lima, Ohio 17 East 42nd St., New York

VULCAN

Locomotives

13" x 18" 32-ton standard gauge saddle tank locomotive with steam brake, automatic couplers, deep bumpers. One of a considerable number of locomotives of the same type and make operated by the Michigan Limestone & Chemical Co., Rogers City, Mich.

From raw material to finished product we practice ceaseless care so that every Vulcan Locomotive is of the quality that has brought world-wide preference for our product.

There is a Vulcan to meet the most exacting requirements of your plant.

VULCAN IRON WORKS

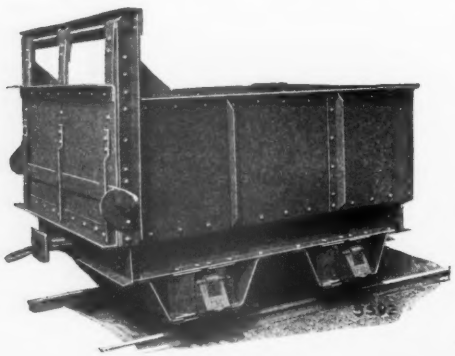
EST. 1849

1753 Main Street, Wilkes-Barre, Pa.

NEW YORK
50 Church Street

CHICAGO
McCormick Building

EASTON QUARRY CARS



Bulletin 21

shows other types of quarry cars. Sent on request

"Quarry Car Practice"

Published Every Now and Then

Part four is now being distributed. This issue contains over 50 illustrations of cars in actual service

TYPE 5592

EASTON CAR & CONSTRUCTION CO.

EASTON, PA.

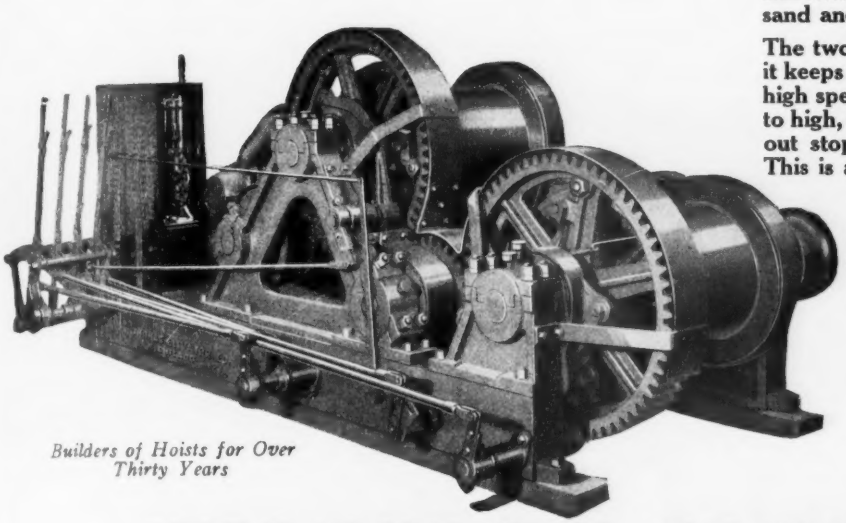
SALES OFFICES

Hudson Terminal, New York
Morris Building, Philadelphia
Kunkel Building, Harrisburg
Jefferson Building, Birmingham
Hearst Building, San Francisco
Oliver Building, Pittsburgh
McKevitt Building, Norfolk
Andrews Law Building, Spartanburg

EASTON CARS

FOR EVERY INDUSTRIAL PURPOSE

Specialized Hoists for Sand and Gravel



Builders of Hoists for Over Thirty Years

The Thomas Two-Speed Electric Slackline Cableway Hoist is an ideal hoist for sand and gravel.

The two speed device is so designed that it keeps pulling in the slow speed until the high speed takes effect; the shift from low to high, and vice-versa, can be made without stopping the rotation of the drums. This is an exclusive Thomas feature.

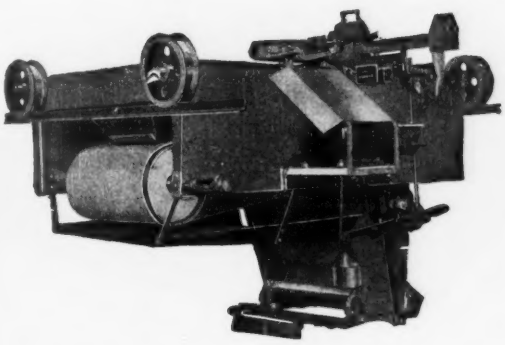
Ask for Bulletin No. 33

Thomas Elevator Company
27 South Hoyne Avenue
Chicago

THOMAS HOISTS

Maintain an Accurate Check on Your Materials

The only safe method of doing this is by weighing the material at strategic points in the line of manufacture.



A Richardson Apron Feed Automatic Scale

will give you accurate weights

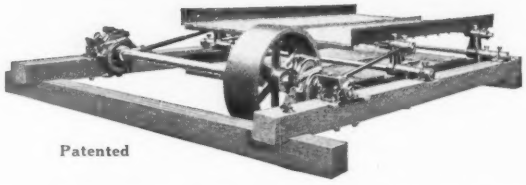
THIS SCALE IS SUITABLE FOR LIMESTONE, MARL, SAND, GYPSUM, CLINKER, CRUSHED ROCK, COAL, and similar materials.

Investigate it and learn where it can be used in your plant.

RICHARDSON SCALE COMPANY, Passaic, New Jersey

New York Boston Chicago San Francisco

ALLIS-CHALMERS
COMPENSATED TYPE SHAKING SCREEN



Patented

You will find the same ruggedness in "Allis-Chalmers" Screening equipment as found in all of their products, the result of a half century of experience. The durability, simplicity and efficiency of the "Allis-Chalmers" Compensated Type Shaking Screen is unequalled by any other screen on the market.

By balancing one screen against the other, much of the vibration in the frame and building is eliminated. Up-to-date commercial limestone and gravel plants realize the vital importance of installing shaking screens, permitting the production of smaller stones to meet the market requirements.

Allis-Chalmers Products

Electrical Machinery
Steam Turbines
Steam Engines
Condensers
Hydraulic Turbines
Pumping Engines
Centrifugal Pumps
Gas Engines
Oil Engines
Mining Machinery
Metallurgical Machinery
Crushing and Cement Machinery
Flour Mill Machinery
Saw Mill Machinery
Air Compressors
Air Brakes
Steam and Electric Hoists
Farm Tractors
Power Transmission Machinery
Perforated Metal
Timber Treating and Preserving Machinery

Write for further information

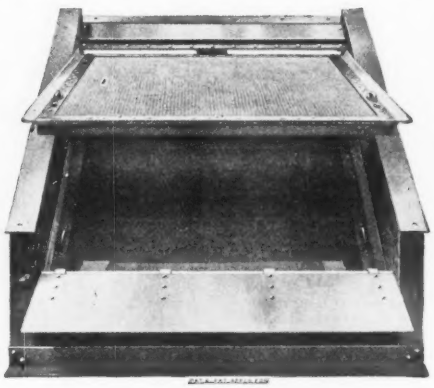
ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS. U.S.A.

District Offices in all principal cities

Heavy Duty Moto-Vibro Screen

FOR
SAND, GRAVEL,
CRUSHED STONE,
ETC.

Coarse or Fine
1 to 3 Products



WET, DRY, DAMP
(within reasonable limits)

ASTONISHING CAPACITIES

ACCURATE OUTPUTS

INEXPENSIVE

SCREEN FRAMES CHANGED IN 5 MINUTES—NO SPECIAL CLOTH

Intense vibration separates adhering sand from pebbles, breaks up sand "mats," prevents building on wire, wedging, and keeps meshes open.

Motor or belt driven, no auxiliaries. Simple, durable, accessible.

STURTEVANT MILL CO. HARRISON SQUARE Boston, Mass.

At Last!

The Ideal Portable Gravel Crushing and Screening Plant

Gravel is brought from the pit in wagons, drags or fresnos, and dumped through a trap directly upon the conveyor, which in turn deposits the material upon a grizzly screen. The undersized material drops through the bars of the grizzly upon a chute leading directly to the elevator, while the oversize rolls down the bars into the crusher.

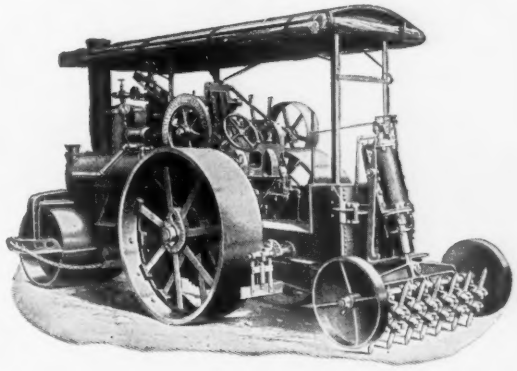
Nos. 2, 3 and 4 Austin Gyratory Crushers can be mounted on trucks and furnished with rigid or folding elevators of the required lengths, and gravel conveyors ranging in length from 30 feet to 50 feet. Optional equipment includes a revolving screen mounted on a portable bin.

While moving from place to place, the elevator folds down over the crusher; the conveyor is disconnected from the crusher, and its lower end attached to a truck or wagon.

A special bulletin describing these portable plants in detail is just off the press. We would like to send you a copy. Ask for Portable Gyratory Crusher Bulletin "H".

Austin Manufacturing Co.

New York Chicago San Francisco



"AUSTIN"

The Last Word in Steam Rollers

The Austin has all the good features common to steam rollers, and in addition has exclusive features of proven value which represent the greatest advance in steam roller construction in years, and add greatly to the operating efficiency of the roller besides saving money for its owner.

The chief feature of the Austin Steam Roller is its extra size boiler with greatly increased heating surface as a result of which the machine has plenty of power to operate a scarifier attachment or pull a separate scarifier. Other construction features which add to the roller's efficiency and life are:

The only single unit transmission.
The only self-aligning engine.
The only boiler having no bolts or studs entering the steam or water spaces.
Larger transmission bearings.
Wider gear faces.

Austin Steam Rollers will measure up to your most exacting requirements, and then surprise you by how far they surpass them. These rollers are fully illustrated and described in Special Roller Catalog FT. Write for your copy today

THE AUSTIN-WESTERN ROAD MACHINERY CO.

Chicago, Illinois

Branches in 22 Cities

"Everything from a Drag Scraper to a Road Roller"

WELLER-MADE EQUIPMENT

For Handling the Materials Mechanically

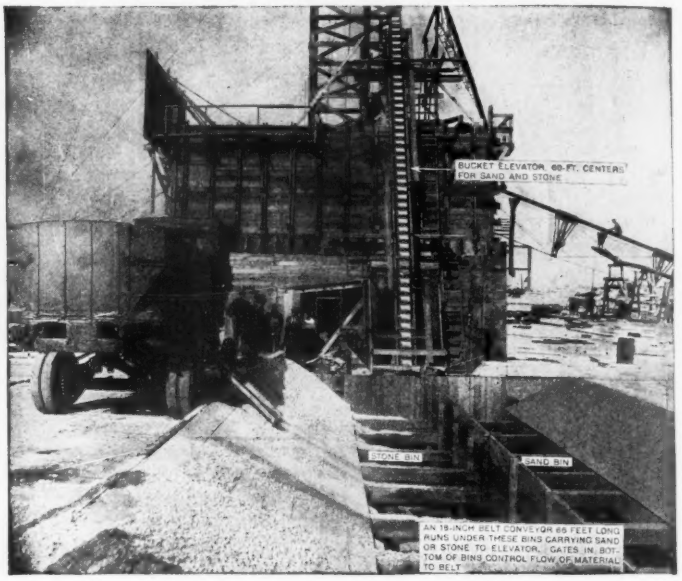
Increase the Output and Reduce Costs by Employing Weller-Made Machinery to Do the Work

It is sturdy and reliable. Never lays down on the job. The cost of operation is small. Will help pay dividends.

We Make
Conveyors of All Types

Bucket Elevators	Portable Elevators
Steel Storage Bins	Bin Gates
Screens	Sheet Metalwork, etc.

Write and let us know the kind of equipment you are interested in or the material you want to handle. Catalogues showing installations, also data to help in selection of equipment, will be sent.


BUCKET ELEVATOR 60-FT. CENTERS FOR SAND AND STONE
STONE BIN
SAND BIN
AN 18-INCH BELT CONVEYOR 65 FEET LONG RUNS UNDER THESE BINS CARRYING SAND OR STONE TO ELEVATOR. GATES IN BOTTOM OF BINS CONTROL FLOW OF MATERIAL TO BELT

WELLER MFG. CO.

1820-1856 North Kostner Avenue SALES OFFICES **Chicago, Illinois**

New York Boston Baltimore Pittsburgh Cleveland San Francisco Salt Lake City

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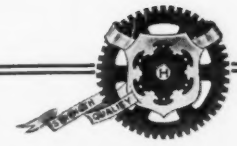

It Floats on Oil

The shafting fairly floats on a permanent film of oil when it is held by Hill Collar Oiling Bearings.

Oil stored in a reservoir in the bottom of the bearing is continuously elevated by a heavy split collar. Metal wipers deflect the oil and distribute it along the full length of the journal. A permanent unbroken film of oil is provided that insures continuous efficient operation.

The Cleveland Type Hill Collar Oiling Bearing is the newest development in Line Shaft Efficiency. Furnished in every style of rigid or ball and socket mountings.

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THE HILL CLUTCH CO.

General Offices and Plant
Cleveland, Ohio

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MANGANESE
THE FIRST ERA STILL LEADS IN QUALITY
STEEL
THE HADFIELD-PENFIELD STEEL COMPANY
BUCYRUS, OHIO

If you are seeking a trouble-free service record in your plant; if you are looking for dependability and efficiency for your machinery, carry a complete line of Era Manganese Steel Repair Parts in your stock room. An era of satisfactory operation follows installation of "Era" repair parts, the repair parts that always satisfy —"ERA."

The Hadfield-Penfield Steel Company
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YORK LIME KILNS

Special Kilns For Special Purposes

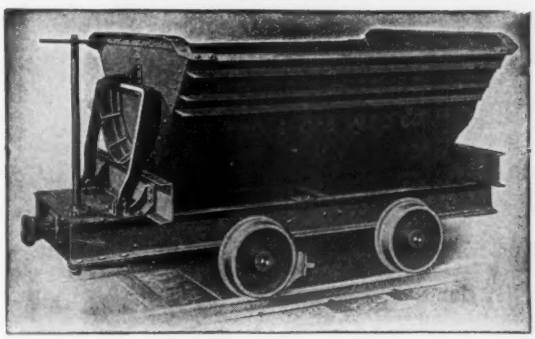
We also manufacture:
Dryers
Hydrators
Gas Producers
Rotary Screens
Tanks
Grey Iron Castings
Special Machinery from Engineers' Designs

Keeping up with progress in the lime industry does not necessarily mean the scrapping of your present plant.

We fit our modern kilns between old-style kilns so as not to conflict with old plant arrangements. In keeping with this idea, we are modernizing the plant of the Cheshire Lime Co., Cheshire, Mass., in just this way.

Working in co-operation with the foremost lime and hydrating engineers in the country enables us to achieve efficiency and economy.

McGann Manufacturing Company, Inc.
Works, York, Pa.
332 S. Michigan Ave., Chicago 50 Church St., New York

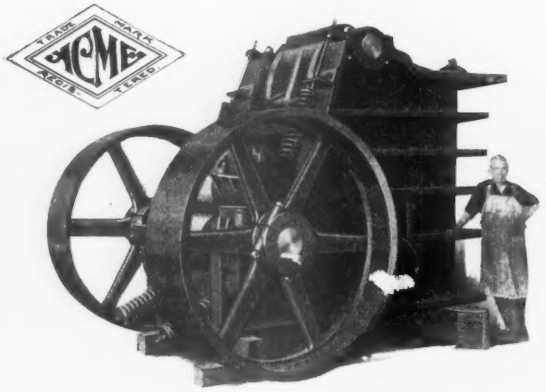


More Than Reinforced

Reinforcing a dump car makes it stronger, of course. But there is a best way to reinforce. Atlas cars are reinforced the best way. Why? Simply because we have built dump cars so long and for so many people that we know just where the reinforcing should go and just how it should be done.

Not much wonder, then, that Atlas dump cars stand the "gaff" better than the average.

The Atlas Car & Manufacturing Co.
ENGINEERS MANUFACTURERS
CLEVELAND, OHIO, U. S. A.



Acme Steel Crushers

6x10 to 42x48

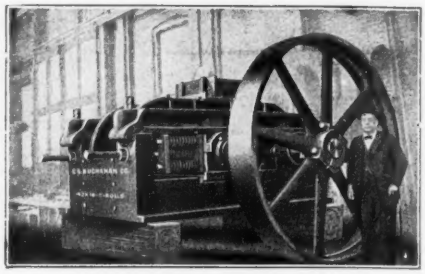
We have in stock for immediate delivery sizes up to 30x36, one piece frame, and up to 26x40, four piece frame.

Diecast Genuine Removable Bearings

Complete Quarry Equipment
Write for Catalogue 12-B

Acme Road Machinery Company
Main Office and Factory
Frankfort, N. Y., U. S. A.

BUCHANAN CRUSHING ROLLS

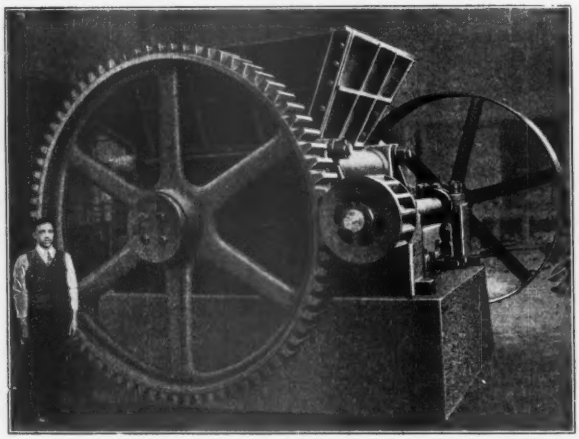


Type "C" Buchanan Box Bed Crushing Rolls for Heavy Duty Bulletin No. 13

Years of manufacturing experience, combined with an intimate knowledge of the conditions under which such machines operate, assures the purchaser of Buchanan Equipment machines of remarkable durability.

COMPLETE CRUSHING PLANTS

C. G. BUCHANAN CO., Inc.
Cedar and West Streets NEW YORK CITY

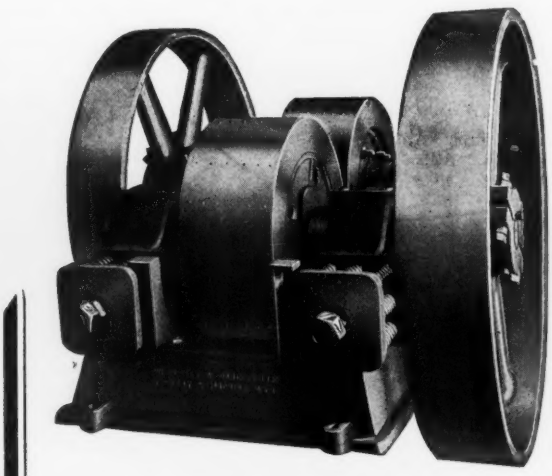


If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.
Hollidaysburg, Pa.
Screens, Elevators, Conveyors, Rock Washers, Etc.



CRUSHERS—

Webb City & Carterville crushers, screens, elevator buckets, or transmission equipment have conspicuously demonstrated their superiority wherever they have been installed.

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WEBB CITY & CARTERVILLE FOUNDRY & MACHINE WORKS
WEBB CITY, MISSOURI

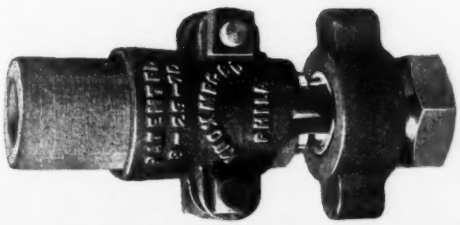
From the

COMPRESSOR

"KNOX"
Male Throttle Valve
Sizes ½", ¾", 1"

Into the

DRILL



"KNOX" ROCK DRILL COUPLING
Sizes ½" to 3"

"EFFICIENCY" and "KNOX PRODUCTS"—either term cannot be used without implying the other.

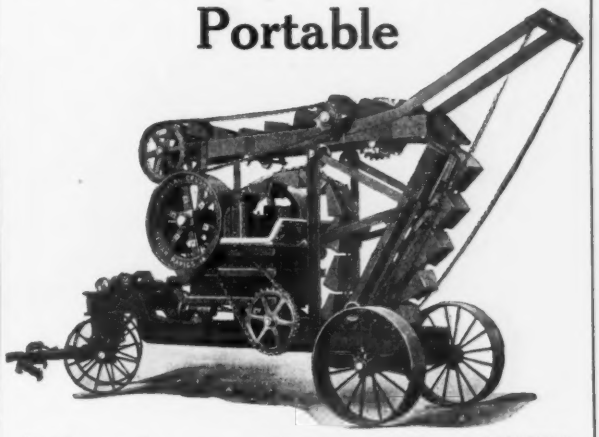
Thru a clear knowledge of the requirements of the workman in the field we have been able for years to furnish a product which has become the standard equipment of most of the Mines and Quarries thruout the world.

For this reason we cannot help but feel that we are a part of these organizations and take great pride in this thought.

Knox Manufacturing Company
821 Cherry St., Philadelphia, Pa.

KNOX
Valves-Couplings-Nipples-Clamps-Menders

Convenient, Practical, Portable



Besides meeting every requirement of PIT and QUARRY in the production of fine crushed stone and gravel

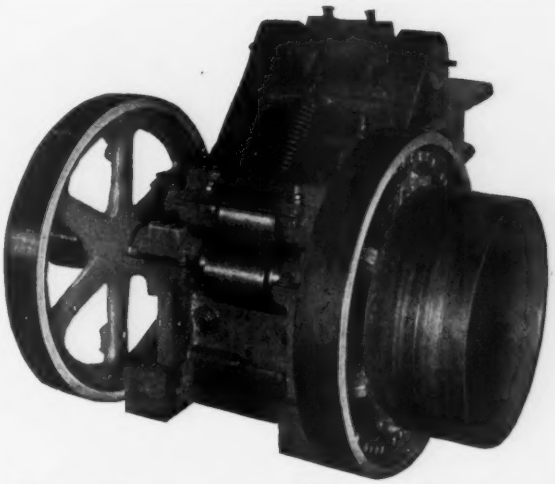
UNIVERSAL STEEL CRUSHERS

are the most convenient and practical large capacity machines on the market for use in portable outfits.

More than 20 sizes to choose from, either stationary or portable. Capacities 2 to 450 tons per day.

Write for information

UNIVERSAL CRUSHER COMPANY
225 Third Street **Cedar Rapids, Iowa**



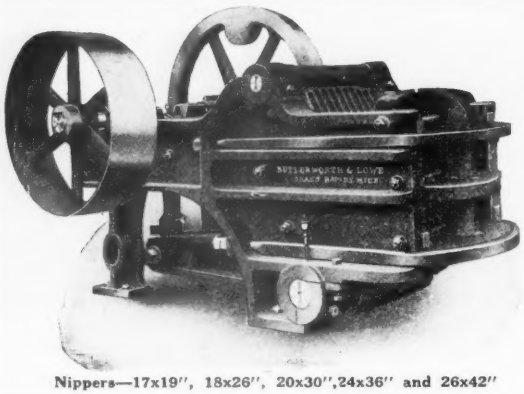
Reliance Crushers

IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.
Branches in all principal cities in U. S. and Canada
MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT



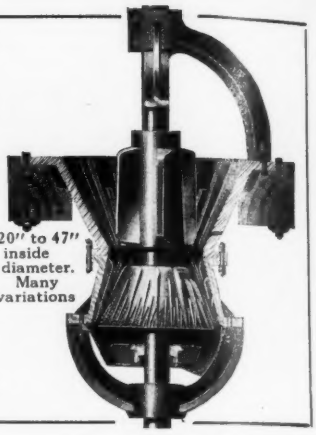
Nippers—17x19", 18x26", 20x30",24x36" and 26x42"

JAW & ROTARY CRUSHERS

For All Rocks and Ores Softer Than Granite

GYPSUM MACHINERY—We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

Special Crusher-Grinders for Lime



20" to 47" inside diameter. Many variations

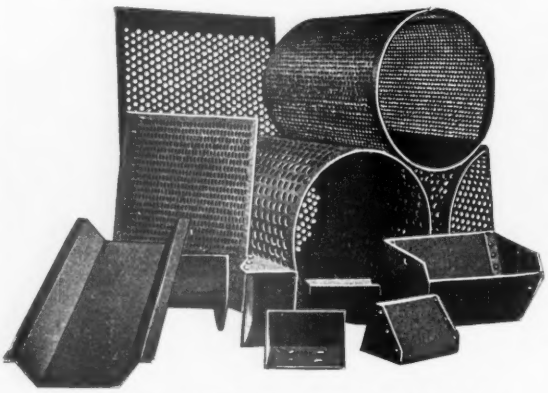
Butterworth & Lowe

17 Huron St. Grand Rapids, Mich.

Perforated Metal Screens

FOR

Stone, Gravel, Sand, Etc.



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PLAIN AND PERFORATED

General Sheet and Light Structural Work

"Light and Heavy Steel Plate Construction"

HENDRICK MFG. CO.

CARBONDALE, PA.

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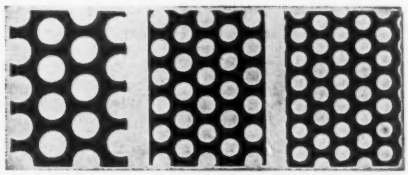
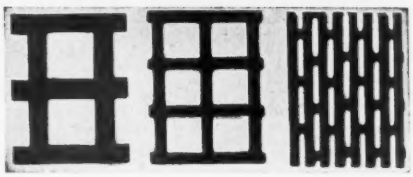
Hazleton, Pennsylvania. Office, 705 Markle Bank Bldg.

Perforated Steel Screens





For Screening Stone, Gravel, Sand and Cement

All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

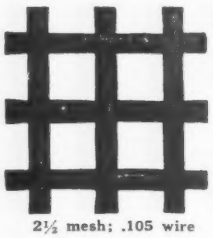
Sheets furnished flat or rolled to shape for revolving screens.

THE HARRINGTON & KING PERFORATING CO.

5650 Fillmore St., Chicago, Ill.

NEW YORK OFFICE: 114 Liberty St.

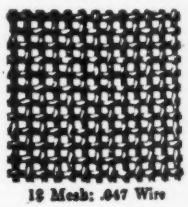
"CLEVELAND" DOUBLE CRIMPED WIRE CLOTH



2½ mesh; .105 wire

A uniform fineness is assured by the use of "Cleveland" Double Crimped Wire Cloth, making it unequalled for the screening of Sand, Gravel, Crushed Stone and Cement. "Service" is the definite policy of this organization, and through every phase of manufacture this end is constantly before us.

A large stock always on hand. However, any special mesh will be manufactured to suit requirements. PRICES RIGHT



18 Mesh: .047 Wire

THE CLEVELAND WIRE CLOTH AND MANUFACTURING COMPANY

3573 East 78th Street **Cleveland, Ohio**

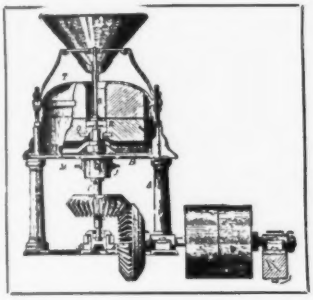
J. C. BUCKBEE COMPANY
Engineers *and* Contractors
CHICAGO, ILL.

Design and build cement plants, rock crushing plants, power plants and industrial structures.

Examinations, Reports and Valuations of Industrial Properties

Do You Do Fine Grinding?

THE Munson Underrunner Buhr Mill has stood the test of time and is still first choice with a large number of concerns whose product demands fine, uniform grinding.



This mill is particularly well adapted for grinding limestone, gypsum, hematite ores, slate and similar materials, though in actual service is is used on a much wider variety of products.

Send us a sample of the material you wish ground so that we may tell you the possibilities of the "MUNSON."

Catalog No. 71 tells more about these mills.

Munson Mill Machinery Co., Inc.
Est. 1825 **Utica, N. Y.**

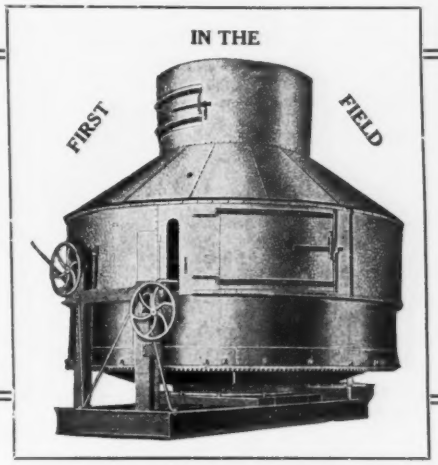
The CLYDE Hydrator

Every day in every way the Clyde is demonstrating its superiorities.

It is by far the easiest to operate. It is the most economical in cost of installation, maintenance and operation.

If you will stop and consider the fact that the Clyde produces 90% of the hydrate of America, you will concede it is a machine worth considering.

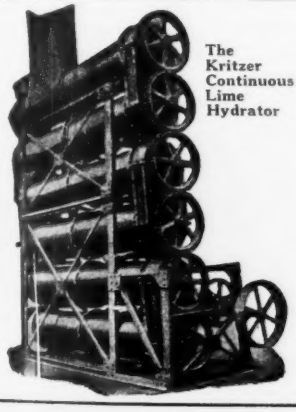
Let us give you complete information.



H. MISCAMPELL
Patentee and Sole Manufacturer

	Patented	Serial No.
	April 3, 1900	646544
	Oct. 10, 1905	801329
	Nov. 29, 1921	1398238

DULUTH **MINNESOTA**



The Kritzer Continuous Lime Hydrator

HYDRATE

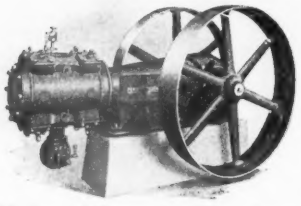
Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

THE KRITZER COMPANY
503 South Jefferson Street **CHICAGO, ILL.**

PENNSYLVANIA
AIR COMPRESSORS and PUMPS



Bulletin 104 describing our air compressors, and bulletin 202 showing our pumps will be good winter reading. Your name below will bring either.

Name.....

Title.....

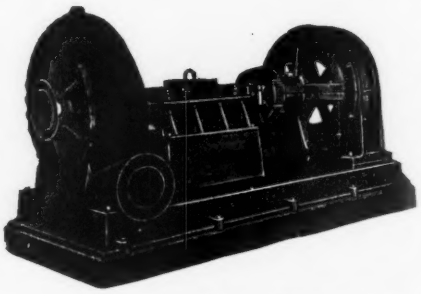
Company.....

Address.....

PENNSYLVANIA
PUMP AND COMPRESSOR COMPANY

MAIN OFFICES AND WORKS EASTON, PA.

BRANCH OFFICES:
325 Penfield Building, Philadelphia, Pa.
50 Church Street, New York City
105 West Monroe Street, Chicago, Ill.



Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4 in. up, arranged for belt, motor, or engine drive.

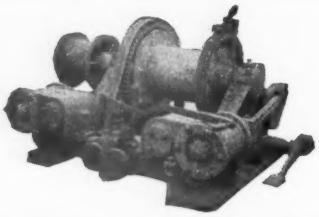
MORRIS MACHINE WORKS
50 Genesee St. Baldwinsville, N. Y.

39 Cortlandt St., New York City
Forrest Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.
Penobscot Bldg., Detroit, Mich.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

MORRIS
Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines

FOR SALE



Emerson-Brantingham Hoists

UNUSED

DOUBLE CYLINDER, SINGLE DRUM, IN FIRST CLASS CONDITION

$125.00 Each F. O. B. Chicago

Capacity, 10,000 Pounds—IMMEDIATE SHIPMENT

Detailed Specifications Furnished on Application

"QUANTITY IS LIMITED"

Relaying Rails and Angle Bars

All Weights and Tonnages for Prompt Shipment

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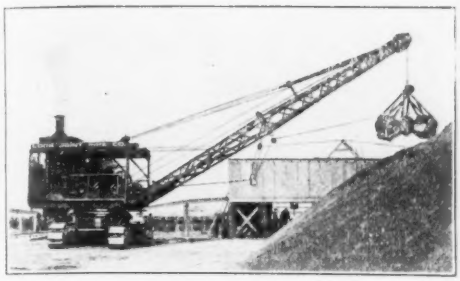
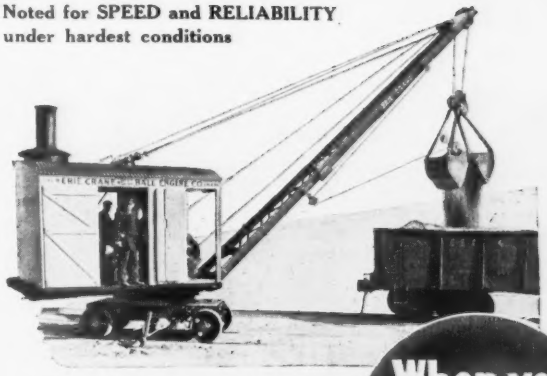


A Clamshell Crane That Will Go Anywhere

Two "AMERICAN" 10-ton Clamshell Cranes on Continuous Chain Treads have made a wonderful record for the Lock Joint Pipe Co., both for handling aggregates and trench excavation. It is a crane that combines lightness and speed with strength and power.

AMERICAN HOIST & DERRICK CO.
Saint Paul, Minn.
New York - Chicago - Pittsburgh - Seattle - New Orleans - Detroit

Noted for SPEED and RELIABILITY under hardest conditions



When you need extra output

This machine saves you money even when it is working at only one-fourth capacity, and replacing only 10 or 12 men—

And when you have ***rush orders,*** and are working your plant to the limit, your ERIE Crane can give results like these:

"We loaded 300 tons of sand in 2 hrs. and 10 mins., digging 3 to 8 ft. below track level. This time included moving from car to car.

"This is too speedy, but we wanted to know what our ERIE Crane can do."—W. B. Manny, President, Hoosier Slide Sand Co., Michigan City, Ind.

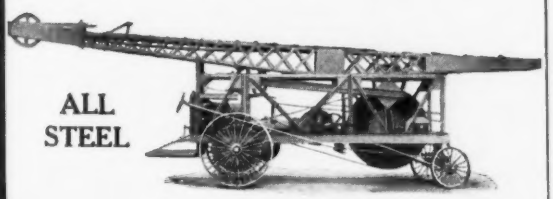
Every ERIE Crane can be quickly and easily changed to steam shovel.

Let us send full description and interesting photos of the ERIE Crane. Write for Bulletin P-30.

ERIE STEAM SHOVEL CO., Erie, Pa., U.S.A.
Builders of ERIE Steam Shovels and Locomotive Cranes

ERIE Revolving Shovels

ARMSTRONG



ALL STEEL

Blast Hole Drill

It is Actual Drilling Time — the hours you run without a stop or shut down—that produces the footage. Real work on the ledges of scores of quarries has proven that the Armstrong stands up better, does more work with less idle time and produces more hole than any other blast hole drill on the market. Make us prove it. Write today.

Armstrong Manufacturing Company
310 Chestnut Street Waterloo, Iowa

DRILLING SPEED

"HOW many feet will it drill per day?" is a universal question asked by quarrymen when they become prospective purchasers of big blast hole drilling equipment.

The answer is, "It all depends on—" See pages 14 to 31 of BIG BLAST HOLE DRILLS (96 pages), published by the Sanderson-Cyclone Drill Co., of Orrville, Ohio. In these pages the various factors and conditions that govern quarry drilling are discussed in detail. This book is free for the asking.

A little further along in the same book you will find a detailed description of a Big Blast Hole Drill that is guaranteed to drill more hole at less costs, all costs considered, than any other big blast hole drill on the market. That drill is the CYCLONE No. 14.

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE, OHIO
Eastern and Export Office: 30 Church Street, New York

Bucyrus 50-B Revolving Shovel

The ideal revolving shovel for quarry service and gravel pits—

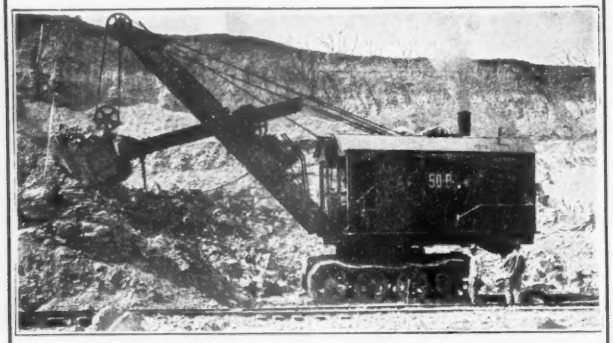
1½ to 2 cubic yard dippers, depending on character of material to be handled.

Built with a strength and power to give steady service with the least possible maintenance.

The only revolving shovel of this size equipped with a locomotive boiler.

Readily equipped as a dragline excavator, clamshell excavator or crane.

Send for Bulletin C-501-P



BUCYRUS

Bucyrus Company, South Milwaukee, Wis.

518

Here Is the New OSGOOD 1¼-Yd. Heavy Duty

Steam Shovel Buyers have been asking us for a 1¼ Yard Shovel having embodied in it OSGOOD Design and Quality.

OSGOOD 1¼ Yd. HEAVY DUTY is here to meet this demand.

You will like this 1¼ Yd. Heavy Duty when you see it. Get our new Bulletin 236, just off the press, for detailed description.

¾, 1, 1¼ yd. Revolving Steam Shovels, Clamshells and Draglines.

1½ to 6 yd. Railroad Type Steam Shovels.

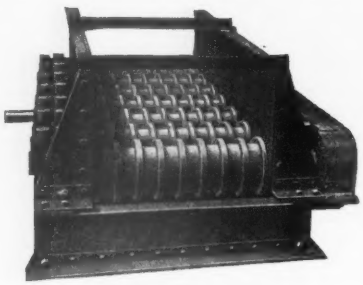
The OSGOOD Company

MARION, OHIO, U. S. A.

ROBINS

Cataract Grizzly

For a Perfectly Sized Product



It is ruggedly constructed; occupies small space; takes but little power; gives a clean product. Machines built to handle up to 1,000 tons per hour and to make any desired separation between 1 inch and 6 inches.

Write for Bulletin No. 60

Robins Conveying Belt Company

New York Chicago Pittsburgh Boston

Sullivan Granite Co., Westerly, R. I., Use Their

Industrial Crane

for Stripping Overburden — Handling Huge Granite Blocks from Quarry to Cars

Mr. Frank A. Sullivan, President advises, "Six laborers at $4.00 per day makes a total yearly cost of $7,200.00. Very little can be accomplished in a quarry with six men, but this $7,200.00 covers all cost of operating, including operator, interest on investment and depreciation of our crane, which does many times the work of six men, and also work impossible to do in any other way. We have found our INDUSTRIAL to be a very profitable investment and a great labor saver."

Let us send you our Golden Anniversary catalog

Industrial Works, Bay City, Michigan

New York Chicago Philadelphia Detroit

1873 SALES ENGINEERS IN ALL PRINCIPAL CITIES BUILDERS OF CRANES FOR 50 YEARS **1923**

Oldest and Largest Manufacturers of Cranes in the Country
17 Different Types, Capacities 5 to 200 Tons

Baldwin Contractors' Locomotives

CONTRACTORS' locomotives must be built to stand hard wear under difficult operating conditions on light and uneven tracks. To secure the best results, it is necessary to select just the type of engine suited to special conditions. Our many years' experience in the building of locomotives for every kind of service enables us to design and build just the right type for every industry.

The Baldwin Locomotive Works
Philadelphia

An Ironton handling rock cars in a limestone quarry

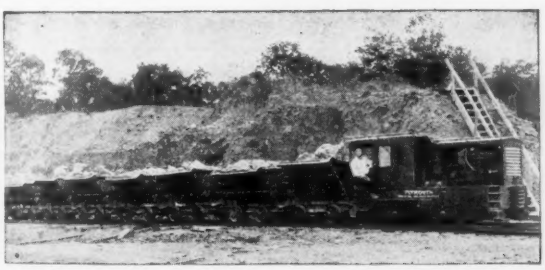
Economical haulage, as applied to your special conditions, is assured by a thorough survey from our Sales Engineers. There is no obligation on your part if you allow us to submit facts and figures concerning your particular problem. We will not recommend an IRONTON Storage Battery locomotive unless we know it will produce satisfactory results.

THE IRONTON
STORAGE BATTERY LOCOMOTIVE

THE IRONTON ENGINE COMPANY
Ironton, Ohio

Branch Offices:

561-B Union Arcade Bldg., Pittsburgh, Pa.
P. O. Box 552 Lexington, Ky.
905 14th Street, Denver, Colo.
1308 American Trust Bldg., Birmingham, Ala.
1618 Arcade Bldg., St. Louis, Mo.
Miners Bank Bldg., Wilkes-Barre, Pa.
409 Weber Road, Columbus, Ohio.
711 First National Bank Bldg., Fort Smith, Ark.



21 Plymouth Locomotives Owned by Morris County Crushed Stone Co.

The Morris County Crushed Stone Co. of Morristown, N. J., and its subsidiaries are one of the biggest producers of crushed stone in the country.

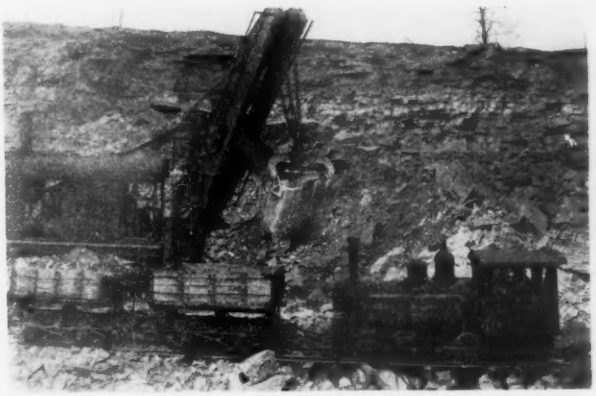
In 1915 Mr. F. W. Schmidt, President, bought their first Plymouth Locomotive. Repeat orders followed until now 21 Plymouths take care of their haulage burden. They write:

"We still have in operation the first Locomotive we purchased from you in 1915. This Locomotive is still doing its bit, which speaks pretty well of your machine."

Write for Catalog and Performance Bulletins.

THE FATE-ROOT-HEATH CO., Plymouth, Ohio

PLYMOUTH
Gasoline Locomotives



Davenport Locomotive
at Hawkeye Quarry Co.

The engraving illustrates one of our 8x10 six wheeled geared locomotives on the job at the Hawkeye Quarries Co.

This locomotive hauls 4 cu. yd. cars of stone. At this quarry the locomotive spots a train of cars above crusher, cuts off, and then picks up a train of empties to return to shovel.

Davenports always deliver a dependable service performance with a minimum in interruption for repairs.

DAVENPORT LOCOMOTIVE WORKS
Davenport, Iowa

American Wire Rope

AND

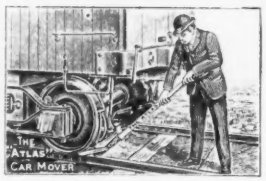
AERIAL WIRE ROPE TRAMWAYS

Send for Illustrated Catalogue

American Steel & Wire Company

Chicago-New York

ATLAS CAR MOVER



The Atlas Car Mover will move a car farther at a stroke and with less effort than any other car mover on the market.

They save time and money. You cannot afford to be without a few.

State what style rail to be used on. We will then know what style to send you.

Write for Prices Today

ATLAS RAILWAY SUPPLY CO.

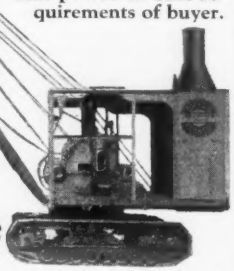
431 South Dearborn Street Chicago, Ill.

Get a Practical Crane

Furnished in mounting and power to suit requirements of buyer.

BOOM can be raised or lowered under load while operating—this is one of the practical features, exclusive with Byers.

Write us for interesting bulletins.



BYERS Model 10

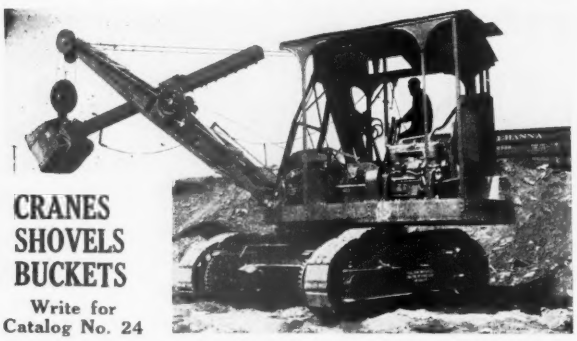
Full Circle Crane

Also Auto-Cranes, Truckranes, Buckets, Hoists, etc.

THE BYERS MACHINE COMPANY, 310 Sycamore St., Ravenna, O.

Chicago Office: Railway Exchange Bldg. New York: 30 Church St.

O. S. DEPENDABLE



CRANES
SHOVELS
BUCKETS

Write for Catalog No. 24

Orton & Steinbrenner Co., 608 South Dearborn St., Chicago

McMYLER-

cranes

Locomotive—Crawler—Traction

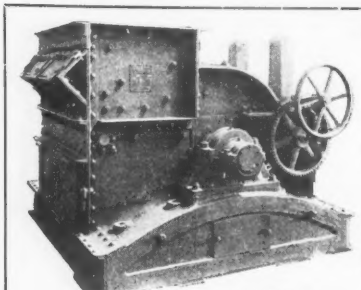
Pile Drivers—Car Dumpers
Equipment for Moving Materials

THE McMYLER-INTERSTATE CO.

CLEVELAND

Sales Offices in All Principal Cities

INTERSTATE



"PENNSYLVANIA" CRUSHERS

for Limestone, Cement Rock, Shale, Lime, etc.

(a) Steel Frame Construction.
(b) Over-size Bearings.
(c) Tramp Iron Separator.
(d) Quick-acting Cage Adjustment.
(e) Steel Wear Liners.

Also Single Roll Crushers and Bradford Coal Breakers.

Put your Reduction Problems up to us.

Merchants Bank Bldg. Chicago

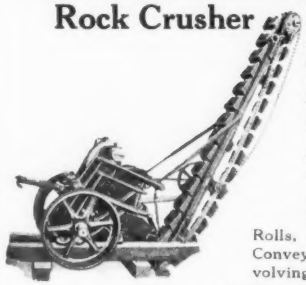
PENNSYLVANIA CRUSHER COMPANY

50 Church St. New York

Oliver Bldg. Pittsburgh

Stephen Girard Bldg., Philadelphia

New Holland Rock Crusher



New Holland Rock Crushers will crush oversize from gravel banks or from larger crushing plants into finer grades, thus securing highest prices. They are durable and inexpensive and run on small power with little attention. Built in sizes from 2 to 15 tons per hour, requiring 5 to 15 h.p. to operate.

Write for descriptive catalog and prices on New Holland Rock Crushers, Recrushing Rolls, Rock Pulverizers, Elevators, Conveyors of various types and Revolving Screens.

Manufactured by

New Holland Machine Co., New Holland, Pa., U. S. A.

AJAX

BULL BEARING ALLOY

"Better than Babbitt"

Ajax Bull Bearing Alloy in your crusher bearings prevents frequent re-babbitting and is a safeguard against costly breakdowns. We'll prove it.

Send for circular A and our offer.

The Ajax Metal Company, Philadelphia

Established 1880

New York Chicago Boston Cleveland

REPEAT orders indicate satisfied customers. That's why we are proud of the fact that a large percentage of our sales are to people who are already operating Sauerman Cableways. One large sand and gravel company has seven of our machines installed at their different plants. If you wish to know why our equipment is so popular, send for Pamphlet No. 17.

SAUERMAN BROS.
430 South Clinton Street Chicago

SAUERMAN DRAGLINE CABLEWAY EXCAVATORS
dig, convey, elevate and dump in one operation

CRESCENT BELT FASTENERS

They Insure Full Power Transmission

They Sustain the Belt's Full Strength

They Make Good Belts give Better Service

CRESCENT BELT FASTENER CO.
381 FOURTH AVE., NEW YORK.

CHILBLAIN AND FROST BITE

May effect your men and animals but the cold and storms of winter are ignored by the operator who accomplishes a permanent solution of his hauling problem by installing an

AUTOMATIC AERIAL TRAMWAY

Let Us Show You

INTERSTATE EQUIPMENT CORPORATION
25 Church Street New York City

Scientifically Designed Equipment

Zepp Automatic Hydrator
Meade Improved Lime Kilns
Complete Lime, Cement and Plaster Plants

Efficiency of Operation—Low First Cost

RICHARD K. MEADE & CO.
Chemical and Industrial Engineers
11 E. Fayette St. Baltimore, Md.

ROBERT W. HUNT CO.

Inspection—Tests—Consultation

Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

INSPECTION AND TESTS OF SAND, GRAVEL, CEMENT, STRUCTURAL STEEL, CASTINGS AND CONSTRUCTION MATERIALS

Cement, Chemical and Physical Testing Laboratories

CHICAGO
2200 Insurance Exchange

New York Pittsburgh St. Louis Kansas City Cincinnati San Francisco

End crusher breakage

with Dings "High Intensity" Magnetic Pulleys

You can't keep iron out of rock. At some stage it enters—bolts, nuts, tie rods, mule-shoes. Then if it doesn't do damage to the crusher, you're lucky.

No, you can't keep iron out of rock—but Dings Magnetic Pulleys will keep it out of crushers. No breakage—no repairs—no shut-downs. *Ask for the bulletin.*

Dings Magnetic Separator Company
803 Smith Street, Milwaukee

SIL-O-CEL

PREVENTS HEAT PENETRATION

Heat Insulation

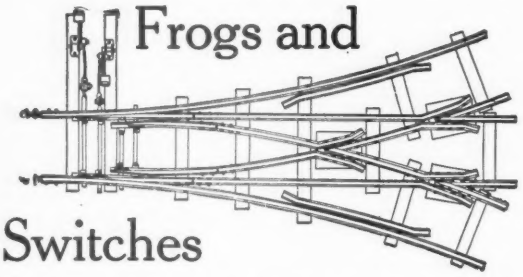
for Cement Kilns and Waste Heat Boilers

Sil-O-Cel Insulation possesses a lower heat conductivity than any other known material and will withstand extremely high temperatures. Furnished in convenient forms for easy application.

Detailed information and blueprints sent upon request. Write for Bulletin S-95.

CELITE PRODUCTS COMPANY

New York: 11 Broadway Chicago: 55 W. Jackson Blvd San Francisco: Monadnock Bldg.
CELITE PRODUCTS LIMITED, New Birks Bldg. Montreal, Canada
OFFICES AND WAREHOUSES IN PRINCIPAL CITIES



Frogs and Switches

The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fish Plates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

We Look Into the Earth

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all minerals.

We are fully equipped for testing foundations for bridges, dams, buildings, and all work of a similar character.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

FULLER PRODUCTS
Insure Fullest Satisfaction

Crushing Rolls.
Pulverizer Mills.
Direct and Indirect Fired Dryers.
Ball and Tube Mill Liners and Partition Plates.
Fuller-Kinyon System for Conveying Pulverized Materials.
Sprockets, Traction Wheels, and Roll Heads.
All kinds of High Grade Chilled Charcoal Iron Castings for All Uses.

Ask for catalogue and prices

FULLER-LEHIGH COMPANY
Fullerton, Pa., U. S. A.

EMERSON STEAM PUMPS

for twenty-five years have been demonstrating their dependability, efficiency and great economy.

Emersons are pulsating steam vacuum pumps that, so far as we know, have given perfect satisfaction to every user.

Immediate deliveries and satisfaction guaranteed.

The Emerson Pump & Valve Co., Inc.
Alexandria, Va.

The Merrick Conveyor Weightometer

Any material which is conveyor-handled can be weighed without additional handling or loss of time by the Merrick Conveyor Weightometer.

An Automatic—Continuous—Accurate Record

Merrick Scale Mfg. Company
Passaic, N. J.

CROSS ENGINEERING CO. CARBONDALE, PA. PERFORATED SHEET METALS

Our screens produce a product clean and perfectly sized.

We can supply repair and renewal parts quickly and correctly. Rush orders can be filled promptly because of our stock of 500 tons or more of steel plates.

Cross Engineering Company
Offices and Works:
Carbondale, Pa.

ANCHOR BRAND COLORS

For Mortar, Cement and Brick—Brown, Black, Red and Buff—Strongest and Most Durable

Manufactured by

C. K. Williams & Co.

Correspondence Solicited EASTON, PA., U. S. A.

The Morgan Producer Gas Machine

is the highest class gas producer built in the U. S. and is advertised in this journal the second issue of each month.

Morgan Construction Company
Worcester, Mass.

W. D. Mount, 601 Peoples National Bank Bldg., Lynchburg, Va., Representative in the Lime Industry

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

EQUIPMENT FOR SALE

BOILERS

300 H.P. Babcock and Wilcox
250 H.P. Sterling
3—66 in. x 16 ft. H. F. T.

ENGINES

24x48 in. Corliss
2—14x22 in. Side Crank
7x14 in. Side Crank

WATER HEATERS

Pittsburg 33 in. x 8 ft.
Webster 30 in. x 5 ft.
Stilwell Biench 30 in. x 5 ft.

PUMPS

Fairbanks-Morse Duplex 4½x3x4 in.
2—Worthington Duplex 10x12x18 in.
2—Worthington Duplex 6x6x4 in.

STEAM SHOVELS

1¼ cu. yd. Vulcan Railroad
2 cu. yd. Vulcan Railroad
1¼ cu. yd. Marion A, operated by 440 volt motor

DREDGE

2 cu. yd. Dipper Dredge Machinery, complete

SUCTION DREDGE PLANT, COMPLETE

12 in. American Manganese Pump, Swintek Cutter, Hoist Priming Pump, Discharge Pipe, Pontoons, Wooden Stiff Leg Derrick, 2 cu. yd. Hayward Bucket, 100 H.P. Electric Hoist, 30 H.P. Swinger
1 Dewatering Tank, ¼ ft., 40 ft. diameter, 19 ft. 10 in. high

HOISTS

Flory, 10x12 in., Two Drum
7x10, Two Drum

CRUSHERS

1—24 in. Symons
1—4 in. Allis-Chalmers Gyratory

LOCOMOTIVES

Brooks 70 ton Switcher, 20x24 in. cylinder, 3—55 in. Drivers

The Ohio Gravel Ballast Co.
Union Central Bldg. Cincinnati, Ohio

FOR SALE

One No. 10K Allis Chalmers Gyratory Crusher, Manganese fitted	$7500
Three No. 6K McCully Gyratory Crushers, Manganese fitted, each	1750
One No. 5K Allis Chalmers Gyratory Crusher	1500
One No. 5 Austin Gyratory Crusher	1250
One 5x22' Power and Mining Tube Mill, steel lined	2500

EQUIPMENT SALES COMPANY
Nashville, Tenn.
"Wire us your requirements at our expense."
"If we don't have it we will get it."

FOR SALE

1—"GATES" 6 x 15 Dry Process ComPeb Mill complete with Chilled Iron Liners, mill arranged for right hand motor belt drive. Purchased September, 1920.

1—"STINE" No. 8 Special Horizontal Type Incline Plane, 6 to 8 ton capacity on 29 degree incline. Purchased February, 1921.

Equipment in EXCELLENT condition. PRICES RIGHT.

Other types of equipment also for sale.

THE STANDARD LIME & STONE CO.
524 Equitable Building Baltimore, Md.

Special Bargains in New and Used Machinery

1—Number 24 American Pulverizer, with extended shaft for driving either side. Never used. Immediate shipment.
Price F. O. B. Masontown, W. Va...$1,000.00

1—75 H.P. Slipring Motor. 3 phase, 60 cycles, 2200 volts. Controller and starting equipment. Never used. Immediate shipment.
Price F. O. B. Masontown, W. Va...$1,000.00

1—Piano wire screen, 8 ft. x 30 in. Never used.
Price F. O. B. Masontown, W. Va.....$100.00

1—Number 6 Gates Gyratory Crusher in good condition. Same crusher would cost in 1920, $5,000.00 F. O. B. Factory.
Price F. O. B. Sturgisson, W. Va...$2,500.00

1—Ruggles-Cole Dryer. Consisting of 24 ft. x 60 in. double cylinder. All rollers and gears and fan. In elegant condition. (No furnace doors or grate bars.)
Price F. O. B. Sturgisson, W. Va...$2,500.00

1—75 H. P. steam engine, 13x18, slide valve, left hand drive. Good condition.
Price F. O. B. Sturgisson, W. Va.....$500.00

Privilege of inspection if desired

Deckers Creek Stone & Sand Co.
Box 186, Morgantown, W. Va.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25', 3½x25', 4x30', 5½x50', 6x60' and 7x60'; double shell dryers, 4x20', 5x30' and 6x35'; steam-heated air rotary dryers, 4x30' and 6x30'.

KILNS—Rotary kilns, 4x40', 5x50' and 6x70', 6x100', 7x80' and 8x110'.

MILLS—6x8', 6x5', 5x4', 3x3½' pebble and ball mills; 3' March mill; 42", 33" and 24" Fuller-Lehigh mills; 4½x20', 5x11', 5x20', 5½x22' and 6x20' tube mills; 7½x13", 9x15", 16x10" and 12x26" jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24", 36" and 40" cage mills; 3' and 4½', 6' and 8' Hardinge mills; 18x12", 20x12" and 30x10" roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 3 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36" Sturtevant emery mill; one 3 roll Griffin mill; 60" chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8', 6x5' and 4x3' Newaygo vibrating screens; Richardson automatic scales; 8' and 10' Emerick air separators.

Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

FOR SALE

No. 18 Universal Pulverizer. New machine. Has never been in operation. Immediate shipment. Address

Box 1707, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

Used Equipment

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SPECIAL BARGAINS

Send Us Your Hoist Inquiries

24x36" TRAYLOR JAW CRUSHER
66x86" TRAYLOR JAW CRUSHER
NEW 22x50" JAW CRUSHERS
Model 221 and 250 MARION SHOVELS
Nos. 4-5-6-7½-9 and 10 CRUSHERS
2-DISC CRUSHERS, 36 in. SYMONS, also 24 in.
100 ton, 2½ yd. ELECTRIC SHOVEL
50 to 5000 ft. steam, belt & elec. compressors
13x30 in.; 10x18 in.; 8x14 in. JAW CRUSHERS
24x54, 18x30, McLANAHAN ROLL CRUSHERS
50 HP. D.D. Hoist, 440 V. 3 Ph. motor, Dragline Set. Also 25 HP. Dragline Equipment.
10 and 12 ton ROAD ROLLERS
5-7½ and 10 HP. PORTABLE CONVEYORS
750-1000 Gpm. Underwriters Steam & Motor Driven Centrifugal Pumps, 220-440 V. 60 Cy. 3 Ph.
100 HP. PORTABLE BOILERS—125-150 lbs., $600

Send us your inquiries

Ross Power Equipment Company
Indianapolis, Ind.

Wanted to Buy Rotary Kilns

Prefer 8x110', or could use larger. Give complete description, location and price.

Box 1718, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

FOR SALE

1—70 ton Steam Shovel
15—5 ton steel body, end dump, heavy duty standard gauge Quarry Cars.
1—No. 4B Gates Crusher.

All in good working order. Low prices to move quickly

INLAND CRUSHED STONE CO.
105 North Clark Street Chicago, Ill.

FOR SALE

4000 lin. ft., 30-in., 20 lb. Track
12 30-in., 1½-yd. Cars
PLYMOUTH GASOLINE LOCOMOTIVE

F. WILLIAM STOCKER
Hoboken, N. J.

FOR SALE

No. 18 Universal Pulverizer—Replaced by larger machine, 90% new with 1¼-in., ¾-in., and ⅜-in. Grate Bars. Price $650 F.O.B. plant. Immediate delivery.

LEESBURG SILICA SAND COMPANY
New Castle, Pa.

FOR SALE

Lincoln Stone Planer, 102 in.; 17-ft. bed; 51 in. under head; complete with electrical equipment, etc. A bargain.

Purchasing Dept., Whiting Corporation
Harvey, Illinois

FOR SALE

Two 150 H.P. General Electric Induction Motors, voltage 440, 60 cycle, 3 phase, with starter, complete
Williams No. 9 Universal type pulverizer, complete
Williams No. 3 Hammer Mill, complete
Sturtevant No. 0 Rotary fine crusher
Jeffrey No. 2 limestone pulverizer on trucks with steel elevator

Address E. W. Cooper
174 Third Avenue, North
Nashville, Tenn.

For Sale

One (1) No. 0 Raymond Mill with air separator, tubular collector, cyclone collector, and fan, complete.
One (1) No. 0000 Raymond Mill.

Alberger Chemical Machinery Co., Inc.
103 Park Avenue New York City

Surplus Equipment For Sale

	f.o.b. cars
20" Bulldog Gyratory Traylor Crusher—good as new. Crushed in all 40,000 tons of Limestone	$4,000
150 H. P. Corliss Valve Engine	$ 900
20—4-yd. 2-way 36" gauge Steel Draft Beam Cars, both Western and Kopple, each	$ 200
2—10x16 Baldwin 36" gauge Dinkeys, each	$1,500
1—10x16 Vulcan 36" gauge Dinkey	$2,750
1—9x14 American 36" gauge Dinkey	$1,200

The above located at Loch Raven, Baltimore, and Ellicott City, Maryland.

The Whiting-Turner Construction Co.
Stewart Building Baltimore, Maryland

FOR SALE

8—6x115 ft. Vulcan Rotary Kilns, condition A-1; unused.

Address Box 1700, care of Rock Products
542 South Dearborn St., Chicago, Illinois

For Sale—Steam Shovels

1—70 C. Bucyrus, 2½ yd. Bucket.
1—60 Marion, 2½ yd. Bucket.
Both standard gauge. Immediate shipment.

Consolidated Products Co., Inc.
15 Park Row New York, N. Y.

FOR SALE

5—Standard Keystone Lime Kilns, capacity 10 ton; practically new
1—No. 1 Williams swing hammer mill crusher—practically new
1—No. 3 new Williams swing hammer mill crusher, with automatic feeder; new, never used
12—All steel, end dump quarry cars, 42-in. gauge; 7 new, 5 slightly used
A number of steel hopper bins and supports
Priced to move quickly

Clinchfield Portland Cement Corp.
Kingsport, Tennessee

1—59-ton standard gauge American 6-wheel Switcher
1—50-ton standard gauge Shay geared locomotive
1—28-ton standard gauge Shay geared locomotive
1—10x16 in., 36 in. gauge, 4-wheel saddle tank
1—30-ton McMyler bucket-handling locomotive crane
1—14-B Bucyrus Steam Shovel, mounted on traction wheels
10—miles 30 and 35 pound relay steel rails, Canton, Mississippi.

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

For Sale—STEAM SHOVEL

⅝ YD. THEW "O" TRACTION

Thoroughly rebuilt; attractive terms for quick sale.

Walter A. Zelnicker Supply Co., St. Louis
Rails, Locomotives, Cars, Tanks, Pipe

Mine Cars, Rails and Locomotives

We have a number of good, serviceable, standard gauge, second hand locomotives, and narrow gauged ones, for immediate shipment.

M. K. FRANK
Frick Building Pittsburgh, Pa.

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

Classified Advertising

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

ATTENTION!

New Industy for Gypsum Manufacturers and Gypsum Quarry-Owners

(American Patent)

We desire to negotiate with gypsum manufacturers and gypsum-quarries-owners, with a view to introduce an entirely new industry in America, for which very large quantities of gypsum will be required. For detailed information apply to

FRANK G. ORR & CO.

17 Blythswood Square Glasgow, Scotland

Florida Hard Limestone Quarry Ready to Develop

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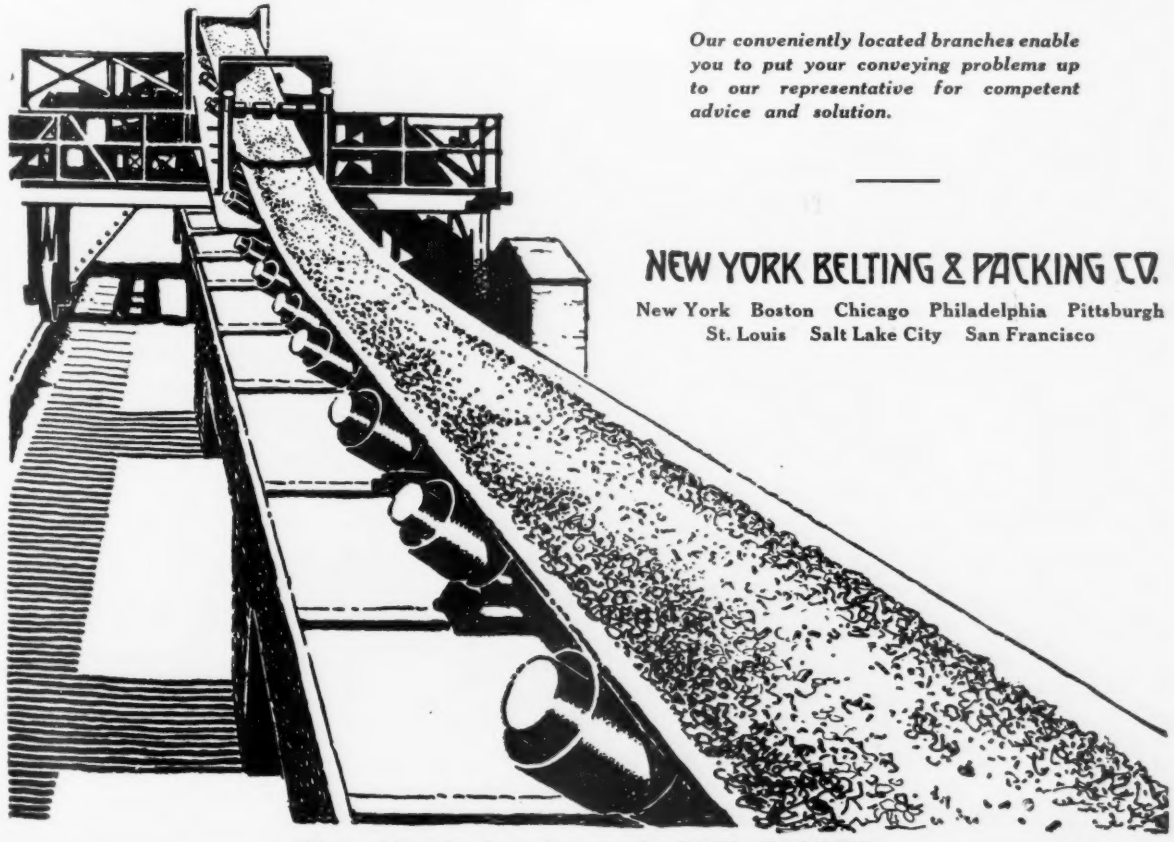

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Rock Products

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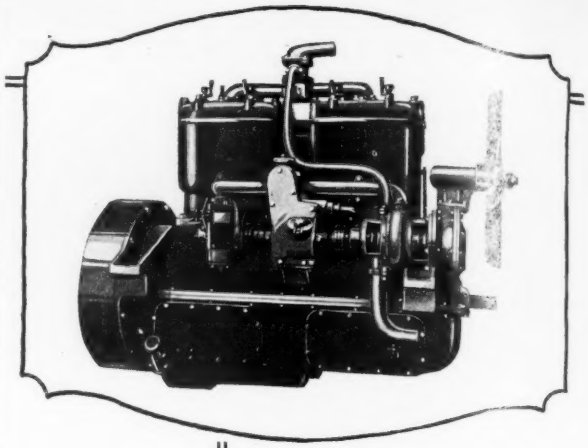

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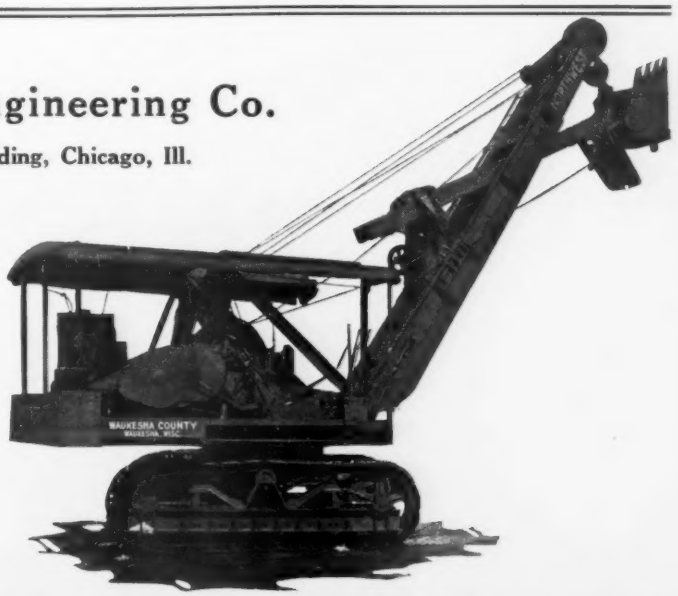

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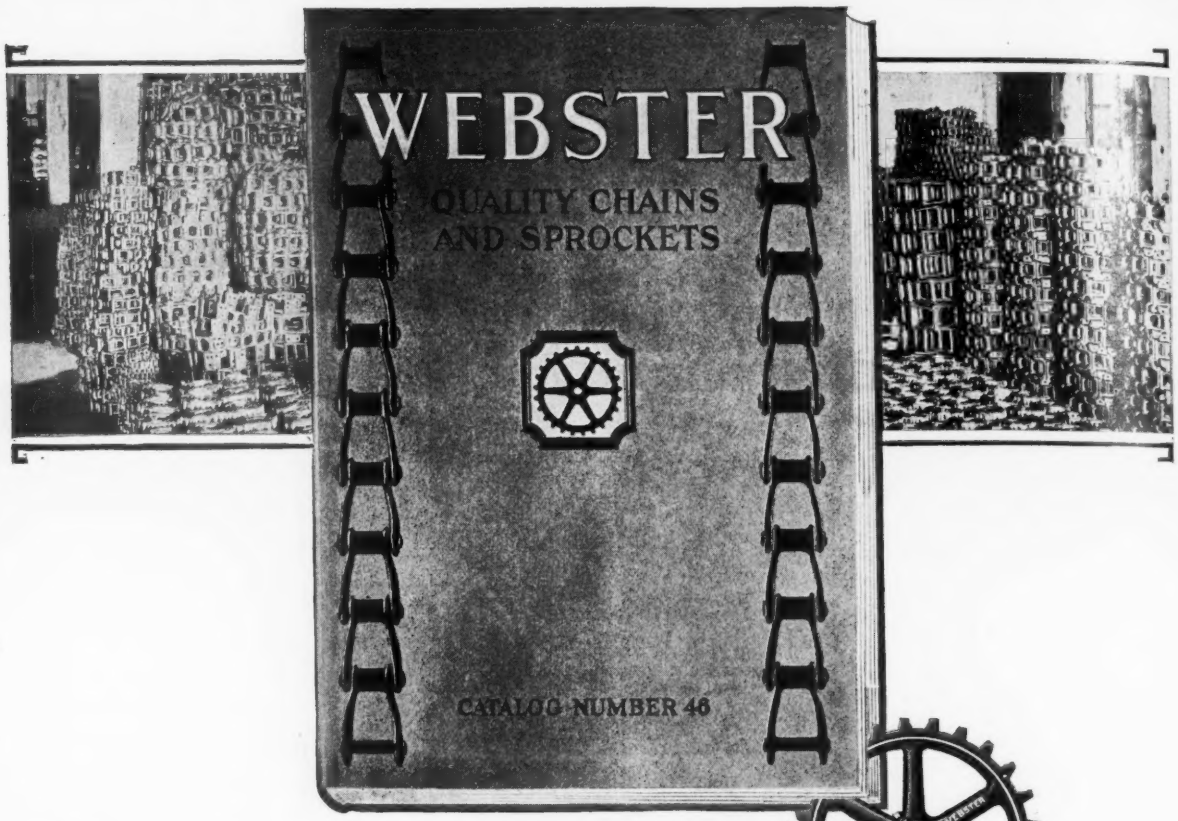

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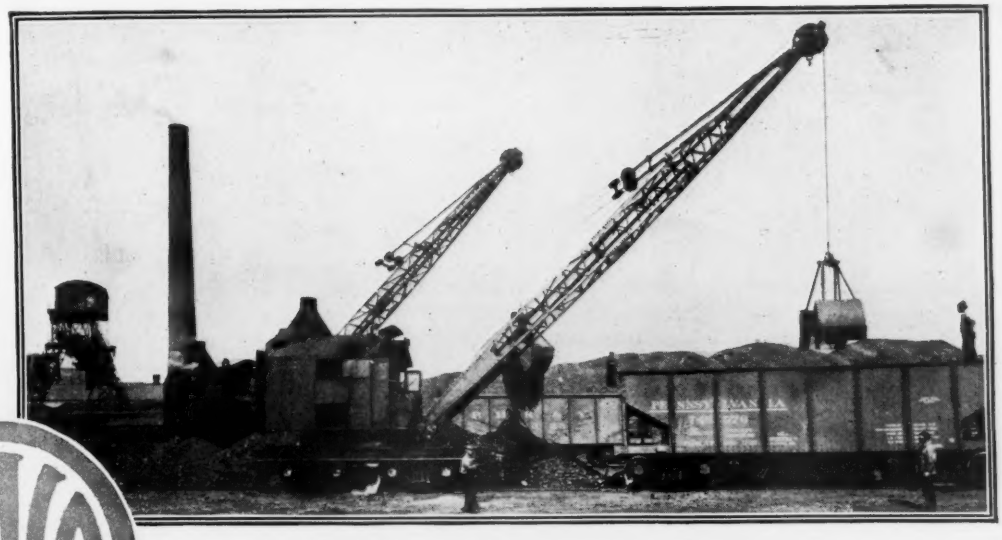

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You will want to know more about this shovel.

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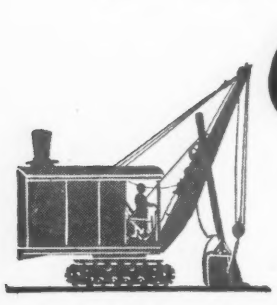

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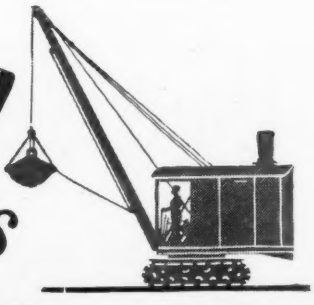

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THE STANDARD SLAG COMPANY

BY C. E. Rinehart
Vice Pres.

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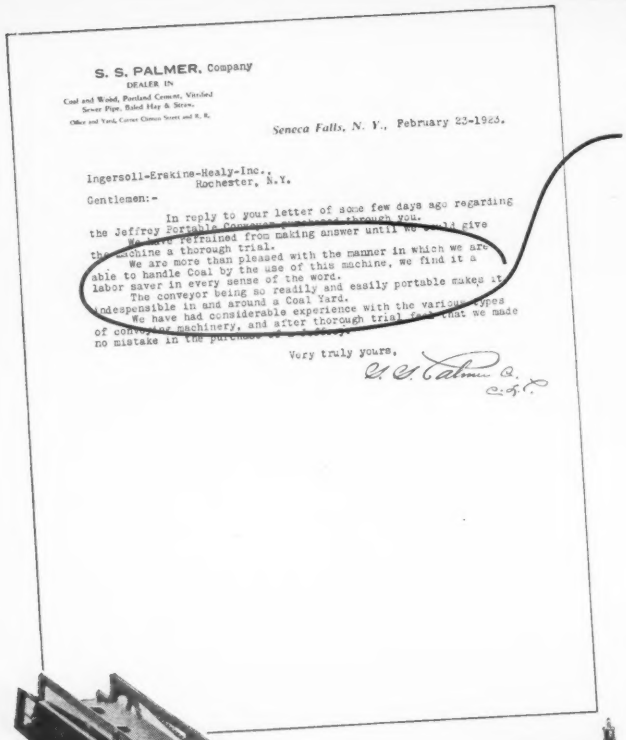
THE Marion STEAM SHOVEL CO.
ESTABLISHED 1884

294

Marion Power Shovels



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S.S.P.

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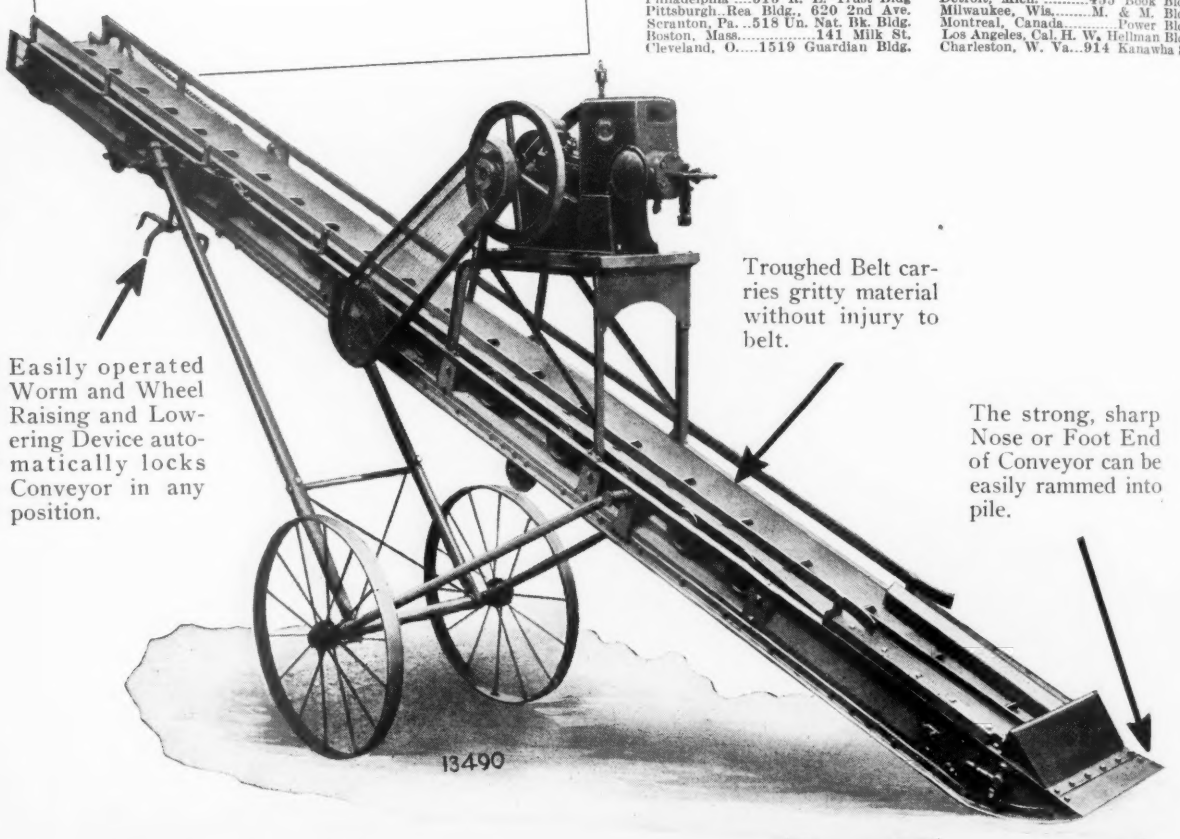

Easily operated Worm and Wheel Raising and Lowering Device automatically locks Conveyor in any position.

Troughed Belt carries gritty material without injury to belt.

The strong, sharp Nose or Foot End of Conveyor can be easily rammed into pile.

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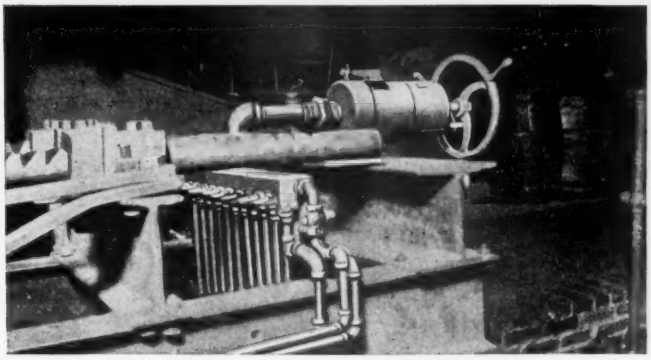


Twenty-two bearings are handled by this four pound lubricator with No. 8 manifold. Write for Bulletin No. 30 for details.

Why pay the cost of neglect?

YOU cannot expect a busy operator to keep his mind always on the out-of-sight, hard-to-reach bearings and attend to them every time they need lubrication.

Inaccessible and hazardous bearings are almost certain to be overlooked. And when bearings suffer for want of attention, friction and premature wear begin.

The Keystone Manifold Safety Lubricator was designed to reduce this risk. It makes a simple, easy job out of a messy, uninviting one.

The Keystone Manifold Safety Lubricator presents a method of applying Keystone Grease under high pressure with pipe line distribution to more than one bearing. No risk to operator, no waste of grease.

Trouble lies in wait for the machine that is not safeguarded against neglected lubrication. You can't keep trouble away with poor lubrication. *Write for free folder "Fight Friction."*

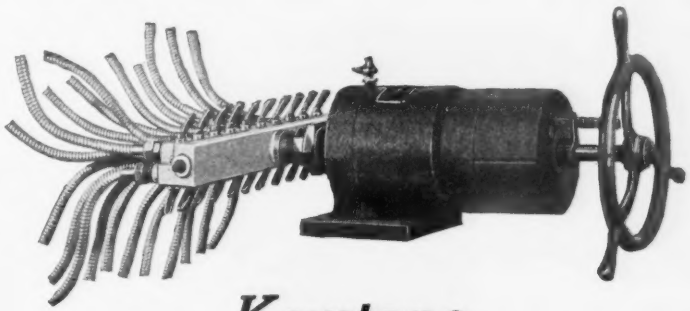
The use of the Keystone Manifold Safety Lubricator is not restricted to immovable bearings. By means of rubber hose it is possible to lubricate rapidly moving bearings.

These lubricators have fed on one line for a distance of over sixty feet with eight elbow turns, the grease discharging freely at the outlets.

In one mill their consumption of oil amounted to five barrels per week. After installing the Keystone Manifold Safety Lubricator, three barrels of Keystone Grease have lubricated the mill for six months—correctly—efficiently.

One other plant reports a saving of $1548.40 after installing the Keystone Lubricator.

Capacity	Outlets
Lubricator 1 lb.	No. 1 Manifold 11
Lubricator 4 lb.	No. 4 Manifold 15
Lubricator 8 lb.	No. 8 Manifold 21



Keystone Manifold Safety Lubricator

FOR USE WITH KEYSTONE GREASE

Different plants, operating under different conditions with different types of machinery, require different methods and forms of lubrication. All the knowledge of scientific plant-operation gathered by our lubrication engineers is at your disposal—a survey of the conditions in your plant and our recommendations will cost you nothing.

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Write direct or to the nearest branch at New York, Boston, Pittsburgh, Montgomery, W. Va., Cincinnati, Knoxville, Memphis, New Orleans, Chicago, Detroit, Minneapolis, St. Louis, Kansas City, Omaha, Tulsa, Okla., Denver, San Francisco. Agencies in Principal Countries throughout the World.

THE KEYSTONE LUBRICATING CO., *Philadelphia*

Executive Offices and Factory: 21st and Clearfield Streets

Clydes on the Job

CLYDE

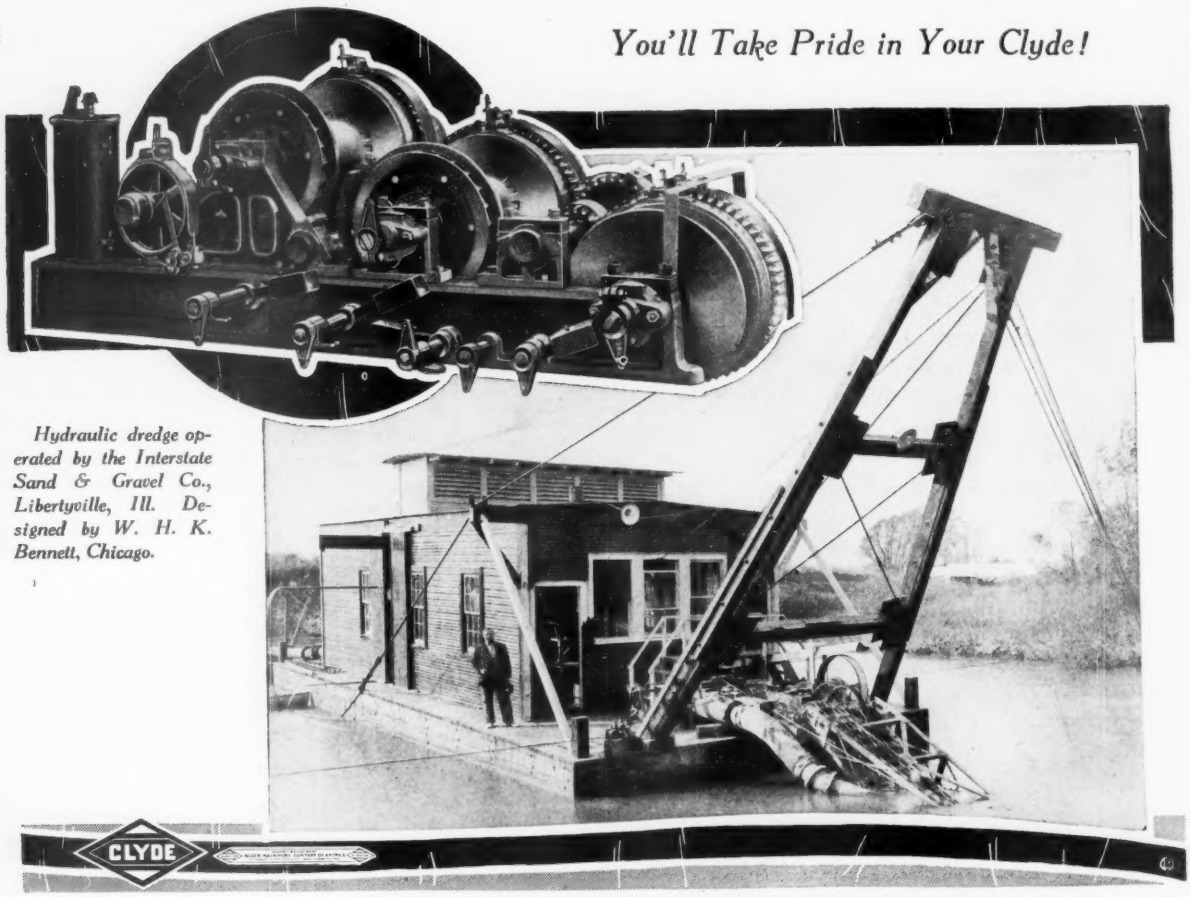
Shown in the photograph below is a hydraulic dredge used for harvesting sand and gravel from a river bottom. The equipment has a capacity of 2,000 tons per ten hours. The dredge hull is 60 ft. long, 26 ft. beam and 4 ft. deep. A 12-inch hydraulic pump raises the sand and gravel.

A 15 H. P. Clyde Electric Hoist with two main drums and two pony drums cares for the raising and lowering of the suction line and cutter, the raising of the spuds and the swinging and moving of the dredge hull. One man hand es the whole operation.

This installation was made at the plant of the Interstate Sand and Gravel Co., at Libertyville, Illinois.

Complete information about this or any other portion of the Clyde line furnished upon request.

You'll Take Pride in Your Clyde!



Hydraulic dredge operated by the Interstate Sand & Gravel Co., Libertyville, Ill. Designed by W. H. K. Bennett, Chicago.

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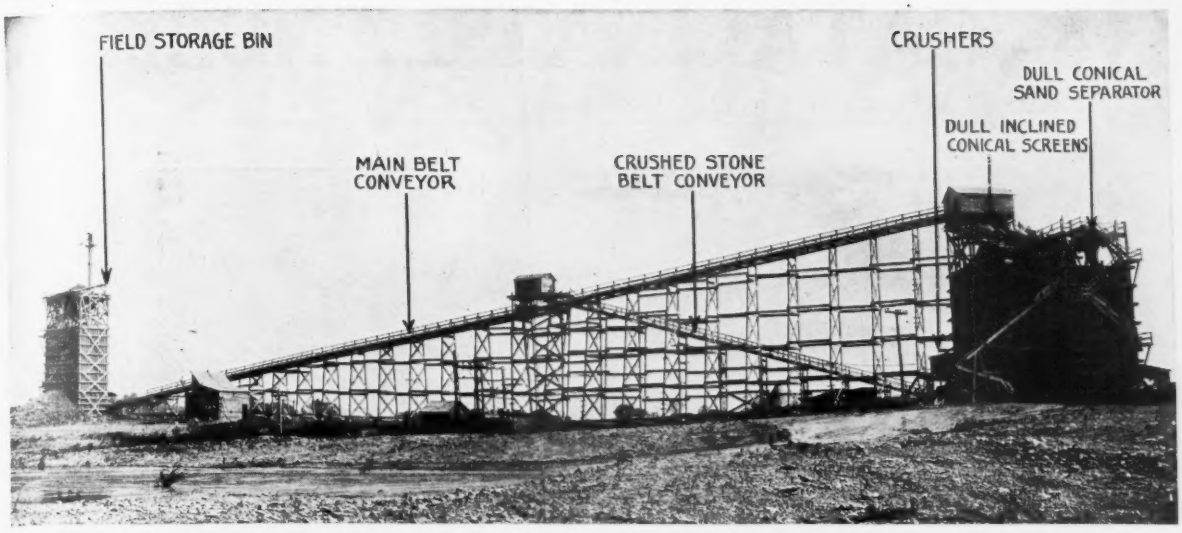

McGrath's Fifth Link-Belt Plant

Send for this valuable book

It shows the complete line of Link-Belt efficient equipment for the handling and preparation of sand and gravel. It is of interest to every operator. Return the coupon.

THIS plant at Joliet, Ill., is the fifth Link-Belt plant built for the McGrath Sand & Gravel Co. Other Link-Belt plants are located at Pekin, Chillicothe, Forreston and Mackinaw, Illinois. Four of these installations were "repeat" orders, following the first over a period of years—an indication of the satisfaction obtained from Link-Belt equipment and engineering.

The capacity of this plant is 30 cars daily. Material is excavated by cableway to a field storage bin of 600 tons capacity and conveyed to washing plant over a 500 ft. center belt conveyor. Standard Link-Belt inclined conical screens and conical separators are used. Over-size rock is crushed and conveyed by separate belt conveyor to main conveyor where it passes thru washery with the gravel.

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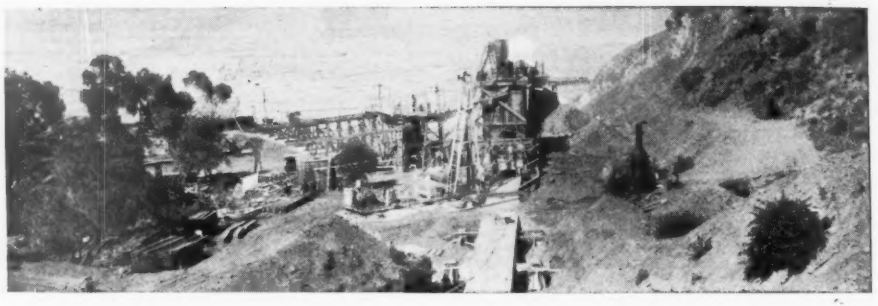

Bulldog Jaw Crusher

The engravings illustrate the installation of a Traylor 48x60-in. "Bulldog" Jaw Crusher at the crushing plant operated by Graham Brothers, on Santa Catalina Island, off the port of Los Angeles.

This "Bulldog" is 254 feet above sea level, and is the initial crusher, handling a hard basalt rock. The Traylor "Bulldog" Jaw Crusher is the acknowledged leader in its class, simply because our engineers recognized and employed common sense principles of crusher design.

It is the strongest, simplest, most accessible, most economical and most dependable crusher on the market and around the world it is chosen in competition with other makes.

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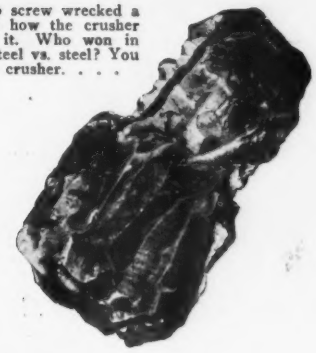

This small cap screw wrecked a crusher. Note how the crusher jaws abraded it. Who won in the battle of steel vs. steel? You should see the crusher. . . .

A screw like this may wreck your crusher!

JUST a small cap screw like the one shown above may put your crusher out of business—stop production—throw men into idleness—cut profits—bring repair bills.

This chewed-up screw was taken from a crusher it had wrecked. The illustration shows what the crusher did to it—and the books of the firm operating the crusher show what it did to the crusher.

Will you be at the mercy of pieces of tramp iron like this—or will you adopt the never-failing safeguard, Dings "High Intensity" Magnetic Separators? The free bulletin will help you to decide.

Where the Dings guards against crusher damage

DINGS protects crushers and grinders in the production of:

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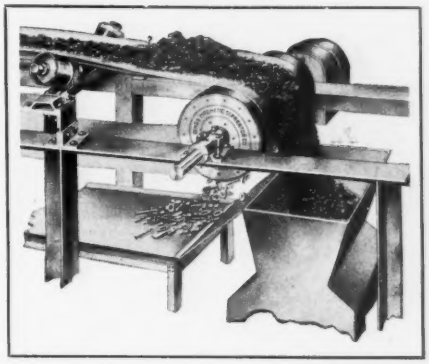

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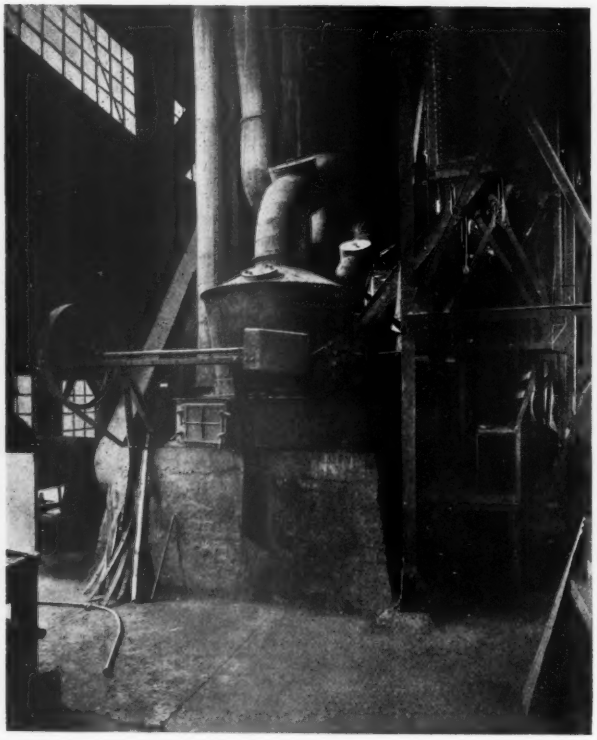

Raymond Roller Mills in Plant of St. Louis Screw Company, St. Louis

Two Raymond 5-Roller Mills Grinding Coal for the St. Louis Screw Co. Save $10,000 a Year In Power Alone Over Equipment Formerly Used for the Same Purpose

It was in 1915 that the St. Louis Screw Co. decided to install powdered coal equipment for their heating furnaces. The first year proved that powdered coal was the most economical fuel they could obtain, but their preparation costs were too high and their grinding mill could not be depended upon to give them a uniform grade of dust. They replaced it with one Raymond Roller Mill, which gave them a uniform fineness of 95 per cent passing a 100 mesh and did as much on 85 H. P. as the former machine did on 200. The installation of a second Raymond Mill followed shortly after.

Today, after seven years of continuous operation, the Raymond Mills are grinding coal at a cost for depreciation, interest on the investment, power, labor and repairs of $0.30 per ton. The total cost for preparing their powdered coal, including drying, pulverizing, handling, storing and repairing, varies from $0.45 to $0.50 per ton.

For those who are using powdered coal or contemplate doing so, it will pay to get the itemized figures on this and other Raymond installations.

Raymond Bros. Impact Pulverizer Co.

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Every Variety of Material Is Grist for the Marcy Mill

Wide varieties of materials are ground by the Marcy Rod Mill in the plant of the Denver Terra Cotta Company — shale, clay, hard porphyry, grog, feldspar, felsite, calcined clay, fire clay—and each with equal success.

The hardness or softness makes no difference. Feldspar, for example, is virtually as hard as quartz — 6 is its hardness.

The moisture content of the feed cuts no figure. In this factory it ranges from bone dry to 18 per cent moisture, yet the grinding results are uniformly satisfactory. And the size of the feed varies from fines to 2½" ring.

Shall we send you Bulletin 68? It's well worth while if you're interested in dry grinding.

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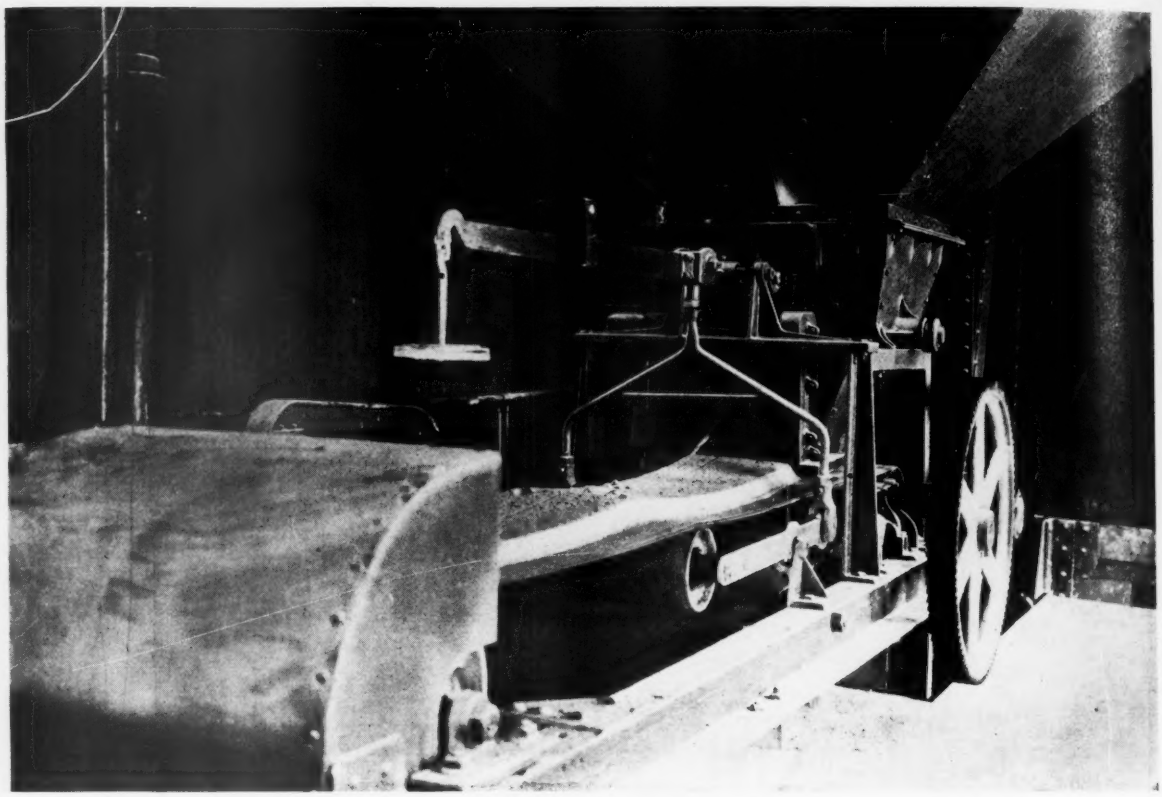
A close-up of a Marcy Rod Mill dry-grinding installation



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